







## Air Quality in Ontario 2003 Report

*Protecting our environment.*



**Ontario**



# Air Quality in Ontario 2003 Report

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## **ACKNOWLEDGEMENTS**

This report has been prepared by the staff of the Environmental Monitoring and Reporting Branch of the Ontario Ministry of the Environment. Canada's National Air Pollution Surveillance program is also acknowledged for providing air monitoring instrumentation, air toxics data and additional quality assurance/quality control of criteria pollutants.

# Foreword

During the 33 years following the first edition of this report in 1971, there has been consistent improvement in the majority of the air pollutants' concentrations measured in Ontario despite significant increases in population, economic activity and vehicle-kilometres travelled.

Encouraging as this is, a great deal of work remains to be done. The Ontario government is directing increased emphasis on two key components of smog, ozone and fine particulate matter ( $PM_{2.5}$ ), which recent scientific evidence suggests have significant adverse health effects.

Data analysis strongly indicates that neighbouring U.S. states – namely Ohio, Illinois and Michigan – are significant contributors to elevated levels of ozone and  $PM_{2.5}$  in southern Ontario. The contributions from long-range transport and transboundary movement of these pollutants need further assessment. Continued monitoring is required to evaluate air quality trends to determine the effectiveness of emissions reduction and abatement strategies.

Ontario has continued to review and enhance its existing air monitoring network stations by deploying real-time monitors, namely the Tapered Element Oscillating Microbalances (TEOMs), for the measurement of  $PM_{2.5}$ . In 1996, only one  $PM_{2.5}$  monitor existed in the network. In 2003, there were a total of 37 TEOMs measuring  $PM_{2.5}$  in real-time across the province. The continued collection and assessment of such data will allow for improvements in the reporting of important air quality information to all Ontarians.

# 2003 Report Findings

- The 2003 air quality report marks 33 years of reporting on the state of air quality in Ontario. This report summarizes province-wide monitoring of ambient air quality.
- The provincial ambient air quality criteria (AAQC) for nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO) and sulphur dioxide (SO<sub>2</sub>) were not exceeded at any of the ambient monitoring sites in 2003.
- As in previous years, ozone and fine particulate matter (PM<sub>2.5</sub>), the main components of smog, continued to exceed ambient criteria levels and reference levels.
- In 2003, Ontario's Ambient Air Quality Criteria (AAQC) for ozone was exceeded at 38 of 39 ambient air monitoring stations on at least one occasion. Thunder Bay was the only site that did not record any hours of ozone above the one-hour AAQC of 80 parts per billion (ppb) in 2003.
- The annual one-hour maximum concentration of ozone has decreased from 1980 to 2003. However, there was an increasing trend in ozone mean concentrations during the same 24-year period.
- In 2003, the PM<sub>2.5</sub> reference level of 30 micrograms per cubic metre (µg/m<sup>3</sup>) for a 24-hour period (based on Canada-wide Standards), was exceeded at 27 sites across Ontario.
- Near seasonal weather conditions prevailed over much of southern Ontario during the 2003 summer season and the 19 smog advisory days issued for the province in 2003 were reflective of this.
- There was a total of seven smog advisories (due to ozone and/or PM<sub>2.5</sub>) in 2003. Six of these advisories occurred during the traditional summer smog season, May to September. The other smog advisory (due to PM<sub>2.5</sub>) occurred on October 10 to 11, 2003.
- Data analysis strongly indicates that neighbouring U.S. states – namely Ohio, Illinois and Michigan – continue to be significant contributors to elevated ozone and PM<sub>2.5</sub> in southern Ontario during the smog season.
- A comparison of air quality in 34 cities world-wide was conducted for year 2003. Overall, the air quality of Ontario cities, Toronto and Ottawa, was generally better than the other cities used in this analysis for the parameters measured.
- Levels of selected volatile organic compounds (VOCs) continued to show a decreasing trend over the last decade.



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# Chapter 1

## Overview

Air pollution is of concern to many people who live in Ontario. Although the average air quality concentrations for the majority of the air pollutants in Ontario have decreased over the past 33 years, smog remains a concern, especially in southern Ontario. Air pollution comes from various sources including stationary sources such as factories, power plants and smelters; mobile sources such as cars, buses, trucks, planes, marine vessels and trains; and finally, natural sources such as forest fires, windblown dust and biogenic emissions from vegetation.

Many pollutants, including those that are associated with smog (ozone and fine particulate matter) remain in the atmosphere for long periods of time. These air pollutants and/or their precursors are generated both locally and regionally, and, with winds, can travel hundreds of kilometres from province to province and country to country, affecting areas far removed from the source of the pollution.

This report focuses on air concentrations based on measurements of key criteria pollutants in

**Table 1.1: Linkages between Air Pollutants and Air Issues**

| Pollutant                       | Smog | Acid Deposition | Odour | Visibility/<br>Soiling | Local vs. Regional |
|---------------------------------|------|-----------------|-------|------------------------|--------------------|
| Ozone                           | Yes  | Yes             | No    | No                     | Regional           |
| Sulphur Dioxide                 | Yes  | Yes             | No    | Yes                    | Local & Regional   |
| Carbon Monoxide                 | Yes  | No              | No    | No                     | Local              |
| Nitrogen Oxides                 | Yes  | Yes             | No    | Yes                    | Local & Regional   |
| Volatile Organic Compounds      | Yes  | No              | Yes   | No                     | Local & Regional   |
| Particles                       | Yes  | Yes             | Yes   | Yes                    | Local & Regional   |
| Total Reduced Sulphur Compounds | No   | No              | Yes   | No                     | Local              |

the ambient outdoor air to assess the state of air quality in the province of Ontario over time.

The Ontario Ministry of the Environment collects continuous ambient air quality data at more than 40 monitoring sites across the province. These data are used to determine the state of air quality in Ontario and help develop abatement programs to reduce the burden of air pollutants, address key air issues and assess the efficacy of policies and programs. Ambient air monitoring in Ontario provides information on the actual concentrations of selected pollutants in communities across Ontario. Table 1.1 shows the relationship between monitored air pollutants and current air issues.

The data collected by the province's state-of-the-art air monitoring network has contributed to several air quality initiatives and regulations. The Ministry of the Environment continues to monitor air quality across Ontario and uses this information to:

- inform the public about outdoor ambient air quality;
- assess Ontario's air quality and evaluate long-term trends;
- identify areas where criteria are exceeded and identify the origins of pollutants;
- provide the basis for air policy/program development;
- provide quantitative measurements to enable abatement of specific sources;
- determine the significance of pollutants from U.S. sources and their effects on Ontario;
- provide air quality researchers with data to link environmental and human health effects to air quality; and
- since 1993, provide smog advisories for public health protection and public outreach.

This report, the 33<sup>rd</sup> in a series, summarizes the state of ambient air quality in Ontario during 2003 and examines trends over time. It covers the

measured levels of six contaminants: ozone (O<sub>3</sub>), fine particulate matter (PM<sub>2.5</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), sulphur dioxide (SO<sub>2</sub>) and total reduced sulphur (TRS) compounds in Ontario. Where appropriate, air pollutant concentrations from selected Ontario cities have been compared to the information available in other cities world-wide (see Figure 1.1). City populations ranged from approximately 335,000 (Pittsburgh) to 12,000,000 (Tokyo). Monitoring methods and siting procedures may vary from country to country; therefore, comparisons among nations are not intended to be used as a comprehensive ranking. Air quality standards for the chosen criteria pollutants in this study may vary from country to country as well, however, the inter-city comparisons represented here are referenced to Ontario's ambient air quality criteria (AAQC) and the national ambient air quality standards (NAAQS) for the United States.

The report also summarizes the results from the Air Quality Index (AQI) and Smog Alert programs and briefly examines smog episodes in 2003. Results for a select number of volatile organic compounds (VOCs) are also reviewed.

The main focus of the 2003 publication is to report on the state of Ontario's ambient air quality. The annual statistics and 10-year trends of ambient data are presented in the attached appendix. Ontario continues to benefit from one of the most comprehensive air monitoring systems in North America. The network is designed to measure continuous air quality at more than 40 ambient monitoring sites across the province and undergoes regular maintenance to ensure a high standard of quality. With these data, we can make informed decisions about what needs to be done to protect and improve the quality of air for Ontarians.

**Figure 1.1**  
**Selected Cities Around the World Used for International Comparison of Air Quality**



1. Adelaide; 2. Amsterdam; 3. Berlin; 4. Buffalo; 5. Cape Town; 6. Chicago; 7. Copenhagen; 8. Denver; 9. Detroit; 10. Frankfurt; 11. Gdansk; 12. Hong Kong; 13. Houston; 14. Jacksonville; 15. Krakow; 16. Los Angeles; 17. Miami; 18. Milwaukee; 19. Montreal; 20. New York; 21. Ottawa; 22. Pittsburgh; 23. Prague; 24. Rochester; 25. San Diego; 26. San Jose; 27. Sao Paulo; 28. Seattle; 29. Singapore; 30. Tokyo; 31. Toronto; 32. Vancouver; 33. Vienna; 34. Warsaw

## Chapter 2

# Ground-Level Ozone

Ground-level ozone ( $O_3$ ) is a gas formed when nitrogen oxides ( $NO_x$ ) and volatile organic compounds (VOCs) react in the presence of sunlight. While ozone at ground-level is a major environmental and health concern, the naturally occurring ozone in the stratosphere shields the earth from harmful ultraviolet radiation.

The formation and transport of ground-level ozone are strongly dependent on meteorological conditions. Changing weather patterns contribute to short-term and year-to-year differences in ozone concentrations. In Ontario, elevated concentrations of ground-level ozone are generally recorded on hot, sunny days from May to September, between noon and early evening.

### *Characteristics, sources and effects*

Ozone is a colourless, odourless gas at ambient concentrations, and is a major component of smog. Ground-level ozone is not emitted directly into the atmosphere. Ozone is formed from chemical reactions between VOCs and  $NO_x$  in the presence of sunlight.

Sources of Ontario's VOC emissions mainly include transportation, such as road vehicles, and the use of general solvents. Sources of  $NO_x$  mainly include transportation, power plants, primary metal production and incineration.

Ozone irritates the respiratory tract and eyes. Exposure to ozone in sensitive people can result in chest tightness, coughing and wheezing. Children who are active outdoors during the summer, when

ozone levels are highest, are particularly at risk. Other groups at risk include individuals with pre-existing respiratory disorders, such as asthma and chronic obstructive lung disease. Ground-level ozone is linked to increased hospital admissions and premature deaths. Ozone also causes agricultural crop loss each year in Ontario, and visible leaf damage in many crops, garden plants and trees.

### *Monitoring results for 2003*

During 2003, ground-level ozone was monitored at 41 locations in 2003; 39 sites were used for the analysis presented here. The highest annual mean was 34.9 parts per billion (ppb), measured at Port Stanley, a rural site on the northern shore of Lake Erie, while the lowest annual mean was 18.7 ppb measured at the Toronto West site. Generally, ozone is lower in urban areas because it is removed by reaction with nitric oxide emitted locally by vehicles and other combustion sources.

Among urban sites in 2003, Belleville recorded the highest one-hour concentration (149 ppb), and the greatest number of instances (103 hours) when ozone was above Ontario's one-hour ambient air quality criterion (AAQC) of 80 ppb. Belleville also recorded the highest annual urban mean (30.9 ppb).

At rural sites, Tiverton measured the highest one-hour concentration (135 ppb), while Port Stanley had the most number of instances (138 hours) above the provincial one-hour AAQC, followed by Simcoe (118 hours).



**Figure 2.1**  
**Geographical Distribution of Number of One-Hour Ozone Exceedances across Ontario (2003)**



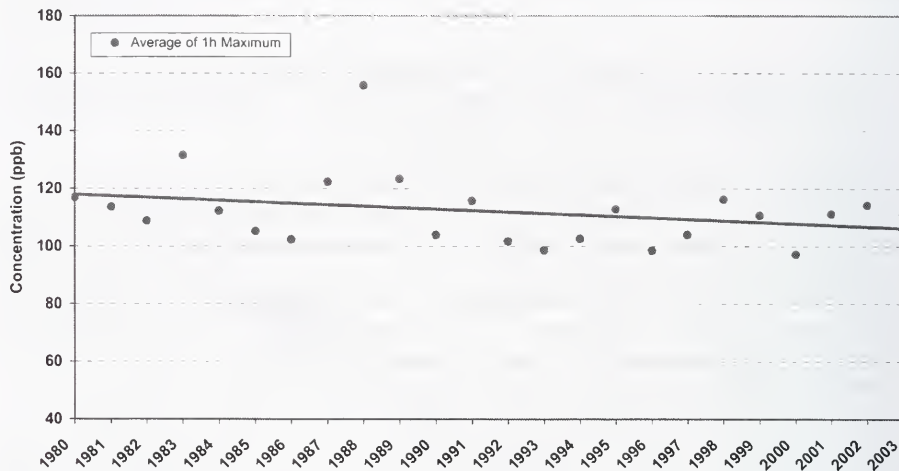
Ground-level ozone continues to exceed its provincial criterion across the province. In 2003, Ontario's one-hour AAQC for ozone was exceeded at 38 ambient air monitoring stations on at least one occasion. Thunder Bay was the only site that did not record any hours of ozone above 80 ppb in 2003.

Figure 2.1 shows the geographical distribution of the number of hours of elevated ozone concentrations across Ontario. The significance of transboundary flow is reflected in the relatively higher levels found at rural sites in the southwestern part of the province along the northern shore of Lake Erie. An area of elevated ozone levels to the east of Toronto in the Belleville area is also evident and is

attributed to the long-range transport of pollutants into Ontario from the U.S. and potential impacts from the urbanized area of the Golden Horseshoe, including that of the Greater Toronto Area (GTA).

In general, ozone levels in southern Ontario decrease from southwest to northeast. More than 50 per cent of provincial ozone levels during widespread smog episodes are due to long-range transport of ozone and its precursors from neighbouring U.S. states. This U.S. contribution is expected to be much higher (as much as 90 per cent) in Ontario cities and towns on the northern shores of Lake Erie, the eastern shores of Lake Huron and in the extreme southwest near the U.S. border.

**Figure 2.2**  
**Trend of Ozone One-Hour Maximum Concentrations in Ontario**  
**(1980 - 2003)**



Note: Based on data from 17 ozone sites operated over 24 years.  
Ontario 1h AAQC = 80 ppb.

### *Trends*

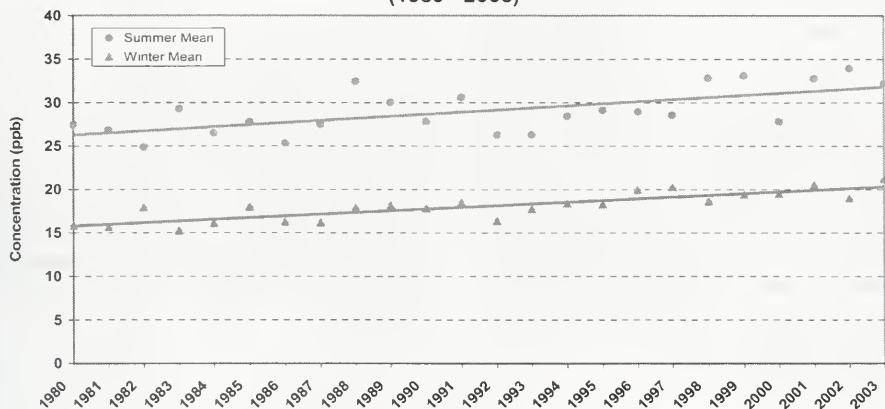
The annual one-hour maximum concentration of ozone is shown from 1980 to 2003 in Figure 2.2. For the 24-year period, the annual one-hour maximum concentrations range from 97 to 156 ppb, with the highest recorded in 1988. Overall, the data show random fluctuations but an overall decreasing trend in annual one-hour maximum concentrations of ozone from 1980 to 2003 is evident.

The trend of the ozone seasonal means (summer and winter) for the 17 (12 urban and five rural) long-term ozone sites for the period 1980 to 2003 is shown in Figure 2.3. It shows that there has been an increasing trend in the ozone seasonal means during the 24-year period. The ozone summer means have increased by approximately 21 per cent and the winter means by approximately 29 per cent over the 24-year period. The increase of the summer mean is

significantly dependent on meteorological factors and the long-range transport of ozone and its precursors from the U.S., in addition to increase in background concentrations, whereas the increase of the winter mean indicates primarily an increase in background concentrations of ozone throughout Ontario. This increase in background ozone is similarly found in other areas across North America.

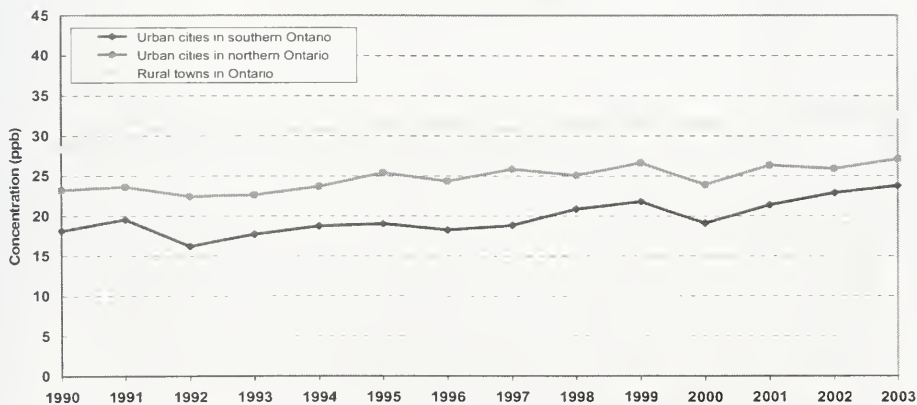
The trend of ozone annual means for urban and rural sites in Ontario for 1990 to 2003 is shown in Figure 2.4. It shows that the ozone annual mean concentrations for urban cities in southern Ontario are consistently about 5 ppb less than those of urban cities in northern Ontario and about 11 ppb less than those in rural Ontario. The destruction of ozone by nitric oxide, substantially present in urban areas, is the reason for the lower ozone concentrations in southern Ontario.

**Figure 2.3**  
**Trend of Ozone Seasonal Means at Sites Across Ontario**  
**(1980 - 2003)**



Note: Based on data from 17 ozone sites operated over 24 years;  
 Seasonal definitions - Summer (May to September); Winter (January to April, October to December).

**Figure 2.4**  
**Trend of Ozone Annual Means for Urban and Rural Ontario**  
**(1990 - 2003)**

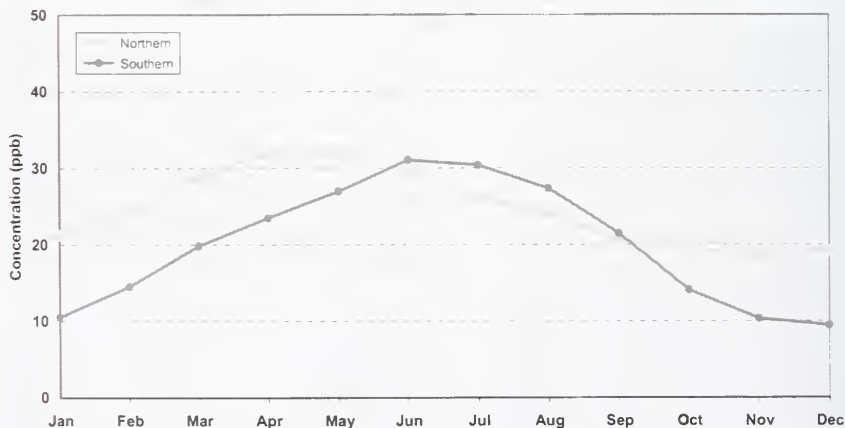


Note: Urban cities in southern Ontario - Windsor, London, Hamilton, Toronto;  
 Urban cities in northern Ontario - Thunder Bay, Sault Ste. Marie, Sudbury, North Bay;  
 Rural towns in Ontario - Grand Bend, Simcoe, Tiverton.

In Figure 2.5, the ozone monthly means are compared in southern and northern Ontario from 1990 to 2003. The ozone monthly mean concentrations are higher in northern Ontario during the cooler months of the year. For the month of January, ozone mean concentrations in the north are almost 11 ppb greater than those observed in the south. Among the possible scientific explanations, local emissions of nitric oxide are lower in the north, so there is less removal of ozone than in southern urban areas. Also, during late winter and early spring, there is greater potential for stratospheric ozone to be mixed into the troposphere in northern Ontario. During the summer months, ozone and its precursors are transported into southern Ontario from the mid-western U.S. causing ozone levels to rise in southern Ontario.

The trend in eight-hour average ozone levels is displayed in Figure 2.6 for eight locations over a 10-year period (1994 to 2003). This figure illustrates an increasing trend of the eight-hour ozone levels for the eight sites examined ranging from < 1 per cent increase in Windsor to 20 per cent increase in downtown Hamilton over the 10-year period. A low per cent change does not necessarily imply that levels are low, but as in the case of Windsor, the levels have been consistent over time. This observation is comparable with the ozone means increasing over the last two decades. The highest per cent increase of the eight-hour ozone levels occurred in Hamilton and Toronto.

**Figure 2.5**  
**Trend of Ozone Monthly Means in Southern and Northern Ontario**  
**(1990 - 2003)**

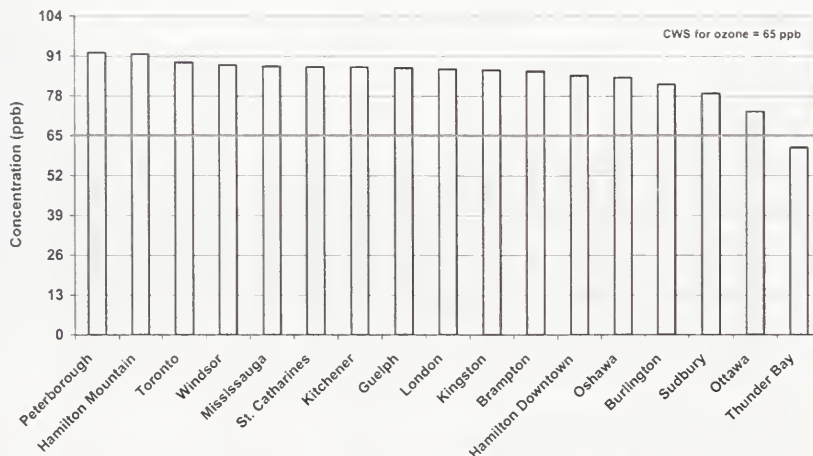


Note: Northern - Thunder Bay, Sault Ste. Marie, Sudbury, North Bay;  
Southern - Windsor, London, Hamilton, Toronto.

**Figure 2.6**  
**Trend of 8-Hour Ozone Levels at Selected Sites in Ontario**  
**Based on Annual 4<sup>th</sup> Highest 8-Hour Average**  
**(1994 - 2003)**



**Figure 2.7**  
**Ozone Levels at Selected Sites Across Ontario**  
**4<sup>th</sup> Highest Ozone 8-Hour Daily Maximum**  
**(2001 - 2003)**



Note: Displayed sites are selected based on future requirements for Canada-wide Standard (CWS) reporting.  
 Toronto reporting is based on Toronto Downtown, Toronto North, Toronto East and Toronto West sites.

### Ozone and the Canada-wide Standard (CWS)

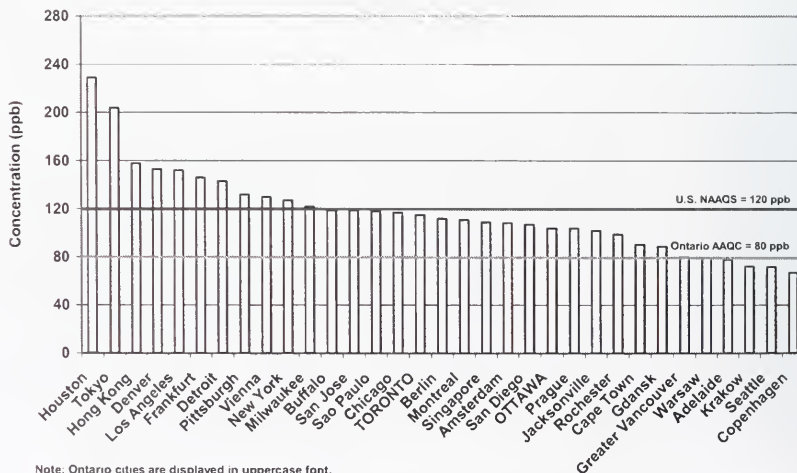
In 2000, the Canadian Council of Ministers of the Environment (CCME) developed a Canada-wide Standard (CWS) for ozone as a result of the pollutant's adverse effects on human health and the environment. As referenced in the *Guidance Document on Achievement Determination*, the CWS for ozone is 65 ppb, 8-hour running average time, based on the 4<sup>th</sup> highest annual ambient measurement averaged over three consecutive years. Jurisdictions are required to meet the CWS by 2010 and commence reporting on the achievement of the CWS for ozone by 2011. However, comprehensive reporting on progress toward meeting the CWS for ozone commences in 2006, therefore the following discussion and analysis focuses on the examination of the 4<sup>th</sup> highest annual ambient ozone measurements across Ontario from 2001 to 2003.

Figure 2.7 displays the 4<sup>th</sup> highest ozone 8-hour daily maximum for selected sites across Ontario averaged over a three-year period, 2001 to 2003. All of the sites exceeded 65 ppb, with the exception of Thunder Bay where the three-year average of the 4<sup>th</sup> highest ozone 8-hour daily maximum was 61 ppb.

### International perspective

Figure 2.8 displays the ozone one-hour maximum concentration in 2003 for 33 cities world-wide. Houston recorded the highest ozone one-hour maximum reaching 229 ppb, while Copenhagen reported the lowest ozone one-hour maximum at 67 ppb. Eleven of the 33 cities examined in 2003 exceeded the U.S. National Ambient Air Quality Standard (NAAQS) ozone one-hour maximum concentration of 120 ppb on at least one occasion. The Ontario AAQC of 80 ppb was exceeded at the majority of cities examined.

**Figure 2.8**  
**Ozone One-Hour Maximum Concentrations for Selected Cities World-wide (2003)**



## Chapter 3

# Fine Particulate Matter

Airborne particulate matter is the general term used to describe a mixture of microscopic solid particles suspended in air. Particulate matter is characterized according to an aerodynamic size – mainly because of the different health effects associated with particles of different diameters. Fine particulate matter (or respirable particles) refer to particles that are 2.5 microns in diameter and less that may penetrate deep into the respiratory system.

Particles originate from many different industrial and transportation sources, as well as from natural sources. They may be emitted directly from a source or formed in the atmosphere by the transformation of gaseous emissions. This chapter discusses the ambient monitoring results from Ontario's fine particulate matter (PM<sub>2.5</sub>) monitoring network.

### *Characteristics, sources and effects*

Particulate matter includes aerosols, smoke, fumes, dust, fly ash and pollen. Its composition varies with origin, residence time in the atmosphere, time of year and environmental conditions. Fine particulate matter may also be formed indirectly through a series of complex chemical reactions in the atmosphere and directly through fuel combustion (e.g. motor vehicles, power generation, industrial facilities, residential fireplaces and wood stoves, agricultural burning and forest fires). Significant amounts of PM<sub>2.5</sub> measured in southern Ontario are of transboundary origin. During periods of widespread elevated levels of PM<sub>2.5</sub>, it is estimated that more than 50 per cent of fine particulate matter in Ontario comes

from the U.S. The U.S. contribution to PM<sub>2.5</sub> concentrations in border cities is estimated to be as high as 90 per cent.

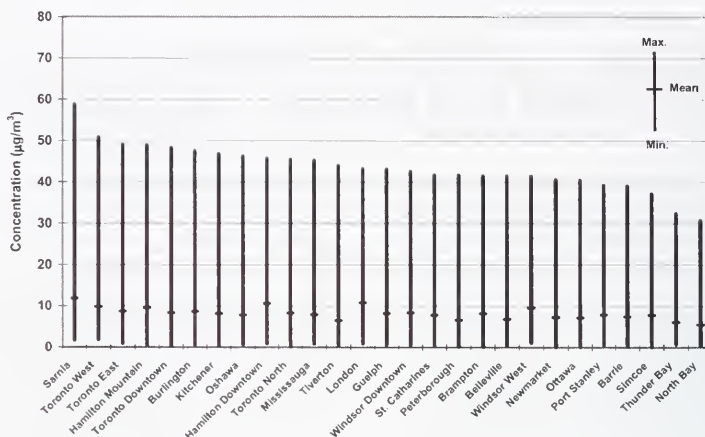
Exposure to PM<sub>2.5</sub> is associated with hospital admissions and several serious health effects, including premature death. People with asthma, cardiovascular or lung disease, as well as children and elderly people, are considered to be the most sensitive to the effects of PM<sub>2.5</sub>. Adverse health effects have been associated with exposure to PM<sub>2.5</sub> during both short periods such as a single day, and longer periods of a year or more. Fine particulate matter may also be responsible for environmental impacts such as corrosion, soiling, damage to vegetation and reduced visibility.

### *Monitoring results in 2003*

In 2003, continuous monitoring for PM<sub>2.5</sub> was conducted at 37 ambient monitoring locations; 27 sites provided sufficient data used for the analysis presented here. All of these monitoring sites operated a Tapered Element Oscillating Microbalance (TEOM) at 30°C with a Sample Equilibration System (SES) to measure the PM<sub>2.5</sub> concentrations on an hourly basis. The annual mean concentrations ranged from 5.5 µg/m<sup>3</sup> in North Bay to a maximum of 11.9 µg/m<sup>3</sup> in Sarnia. Sarnia also recorded the highest 24-hour average of 58.9 µg/m<sup>3</sup>. The PM<sub>2.5</sub> reference level of 30 µg/m<sup>3</sup> for a 24-hour period (based on the Canada-wide Standard (CWS)) was exceeded at least once at all of the locations displayed in Figure 3.1. The provincial ambient average for PM<sub>2.5</sub> during 2003 was 8.2 µg/m<sup>3</sup>.

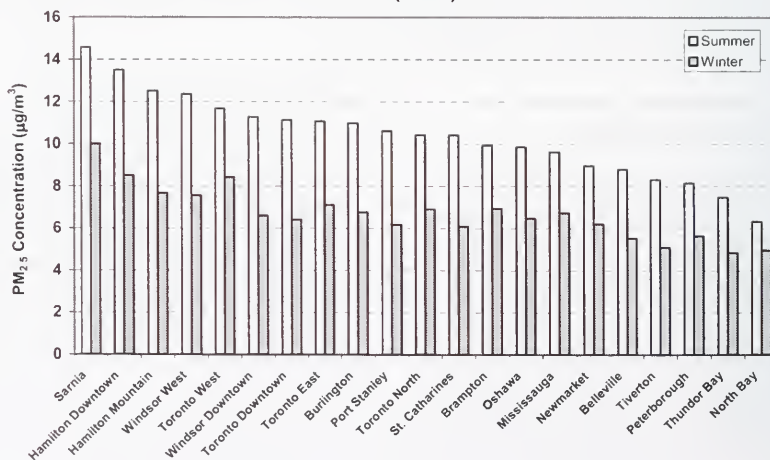


**Figure 3.1**  
Annual Statistics for 24-Hour  $PM_{2.5}$   
(2003)



Notes:  $PM_{2.5}$  concentrations are measured by TEOM (Tapered Element Oscillating Microbalance).

**Figure 3.2**  
Seasonal Distribution of  $PM_{2.5}$  at Sites Across Ontario  
(2003)



Note:  $PM_{2.5}$  concentrations are measured by TEOM (Tapered Element Oscillating Microbalance);  
Seasonal distribution based on an average of monthly means.  
Seasonal definitions - Summer (May to September), Winter (January to April, October to December).



The seasonal variability of  $PM_{2.5}$  is more distinct when comparing the summer and winter means for the 21 ambient sites that reported a full year of data during 2003 (Figure 3.2). The means in the summer months are much greater than the means of the winter months. The air monitoring site in Sarnia recorded the highest means during summer and winter seasons,  $14.6 \mu\text{g}/\text{m}^3$  and  $10.0 \mu\text{g}/\text{m}^3$ , respectively. The lowest means were recorded at North Bay ( $6.3 \mu\text{g}/\text{m}^3$ ) during the summer and Thunder Bay ( $4.9 \mu\text{g}/\text{m}^3$ ) during the winter.

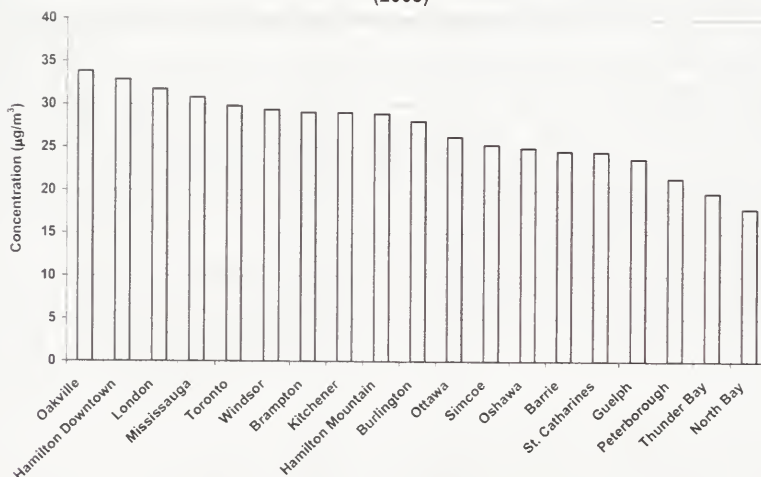
#### *$PM_{2.5}$ and the Canada-wide Standard (CWS)*

In 2000, the Canadian Council of Ministers of the Environment (CCME) developed a Canada-wide Standard (CWS) for  $PM_{2.5}$  as a result of the pollutant's adverse effects on human health and the environment. As referenced in the *Guidance Document on Achievement Determination*, the CWS

for  $PM_{2.5}$  is 30 micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ ), 24-hour averaging time, based on the 98<sup>th</sup> percentile annual ambient measurement averaged over three consecutive years. Jurisdictions are required to meet the CWS by 2010 and commence reporting on the achievement of the CWS for  $PM_{2.5}$  by year 2011. However, comprehensive reporting on progress toward meeting the CWS for  $PM_{2.5}$  commences in 2006, hence, the following discussion and analysis mainly focus on the examination of  $PM_{2.5}$  98<sup>th</sup> percentiles across Ontario in 2003.

Figure 3.3 displays the 98<sup>th</sup> percentile  $PM_{2.5}$  daily average for selected sites across Ontario in 2003. The 98<sup>th</sup> percentiles ranged from  $17.9 \mu\text{g}/\text{m}^3$  in Thunder Bay to  $33.8 \mu\text{g}/\text{m}^3$  in Oakville. Four of the 19 ambient sites exceeded  $30 \mu\text{g}/\text{m}^3$ .

**Figure 3.3**  
 **$PM_{2.5}$  Levels in Selected Cities Across Ontario**  
98<sup>th</sup> Percentile  $PM_{2.5}$  Daily Average  
(2003)



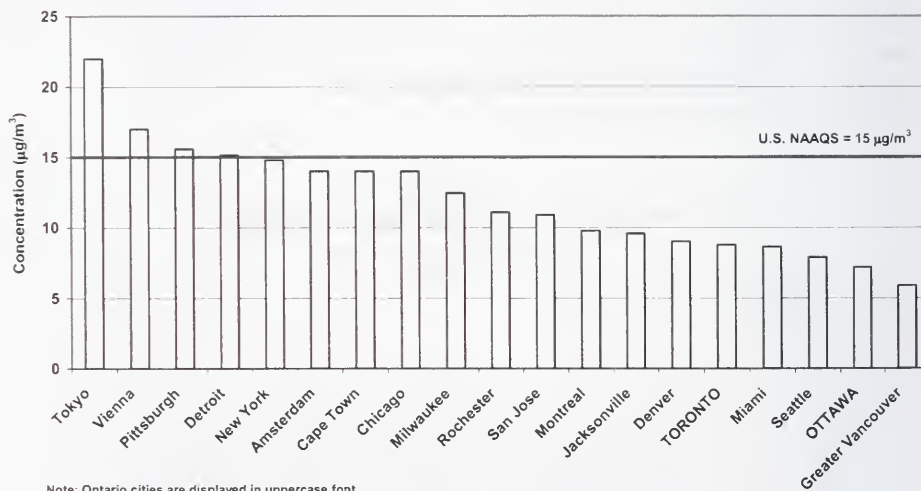
Note:  $PM_{2.5}$  concentrations are measured by TEOM (Tapered Element Oscillating Microbalance);  
Displayed sites are selected based on future requirements for Canada-wide Standard (CWS) reporting.

### International perspective

Figure 3.4 displays PM<sub>2.5</sub> annual means in 2003 for 19 selected cities world-wide. Tokyo reported the highest annual mean PM<sub>2.5</sub> concentration (22.0 µg/m<sup>3</sup>) for 2003. The annual U.S. NAAQS of

15 µg/m<sup>3</sup> was exceeded in four cities, Tokyo, Vienna, Pittsburgh and Detroit. The Greater Vancouver area recorded the lowest annual mean PM<sub>2.5</sub> concentration of 5.9 µg/m<sup>3</sup>.

**Figure 3.4**  
**PM<sub>2.5</sub> Annual Means for Selected Cities World-wide**  
**(2003)**



## Chapter 4

# Other Criteria Contaminants

Characteristics, sources and effects of nitrogen dioxide ( $\text{NO}_2$ ), carbon monoxide ( $\text{CO}$ ), sulphur dioxide ( $\text{SO}_2$ ), and total reduced sulphur (TRS) compounds are discussed in this chapter, as well as their ambient concentrations during 2003 and trends over time. A comparison of pollutant concentrations from an international perspective (where applicable) is also drawn and examined.

### **NITROGEN DIOXIDE**

#### *Characteristics, sources and effects*

Nitrogen dioxide ( $\text{NO}_2$ ) is a reddish-brown gas with a pungent and irritating odour, which transforms in the air to form gaseous nitric acid and nitrates. It also plays a major role in atmospheric reactions that produce ground-level ozone, a major component of smog. Nitrogen dioxide is also a precursor to nitrates, which contribute to levels of fine particulate matter in the atmosphere.

All combustion in air produces nitrogen oxides ( $\text{NO}_x$ ), of which  $\text{NO}_2$  is a significant component. Major sources of  $\text{NO}_x$  emissions include the transportation sector, fossil fuel power generation, primary metal production and incineration.

Nitrogen dioxide can irritate the lungs lowering the resistance to respiratory infection. People with asthma and bronchitis have increased sensitivity. Nitrogen dioxide chemically transforms

into nitric acid in the atmosphere and, when deposited, contributes to lake acidification. Nitric acid can also corrode metals, fade fabrics, degrade rubber, and damage trees and crops.

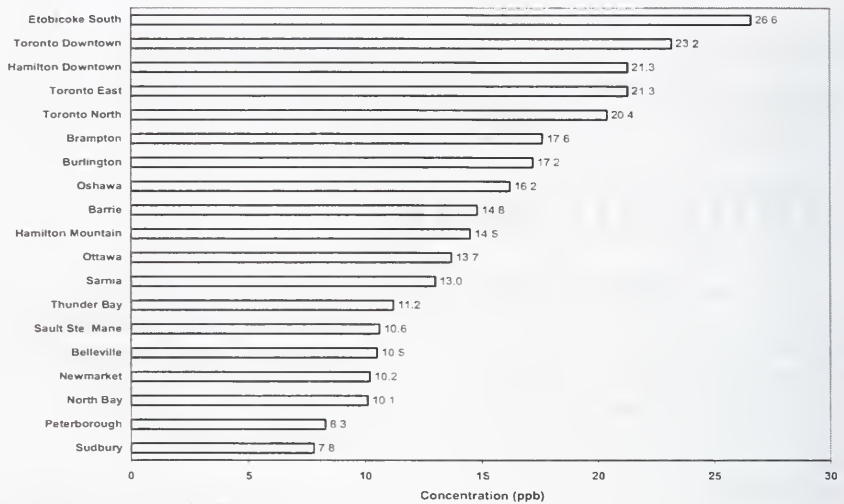
#### *Monitoring results for 2003*

Monitoring for  $\text{NO}_2$  was conducted at 29 ambient locations in 2003: 19 sites provided sufficient data for an annual mean. Nitrogen dioxide annual means across Ontario are displayed in Figure 4.1. The Etobicoke South site, located in a heavily industrialized and vehicular traffic-influenced area of Toronto, recorded the highest annual mean (26.6 ppb) during 2003. Typically, the highest  $\text{NO}_2$  means are recorded in large urbanized areas, such as the Golden Horseshoe area of southern Ontario including the Greater Toronto Area (GTA). The Toronto West air monitoring station recorded the highest 24-hour concentration (71 ppb) and the highest one-hour concentration (119 ppb) in 2003. The provincial 24-hour criterion of 100 ppb and one-hour criterion of 200 ppb for  $\text{NO}_2$  were not exceeded at any of the monitoring locations in Ontario during 2003.

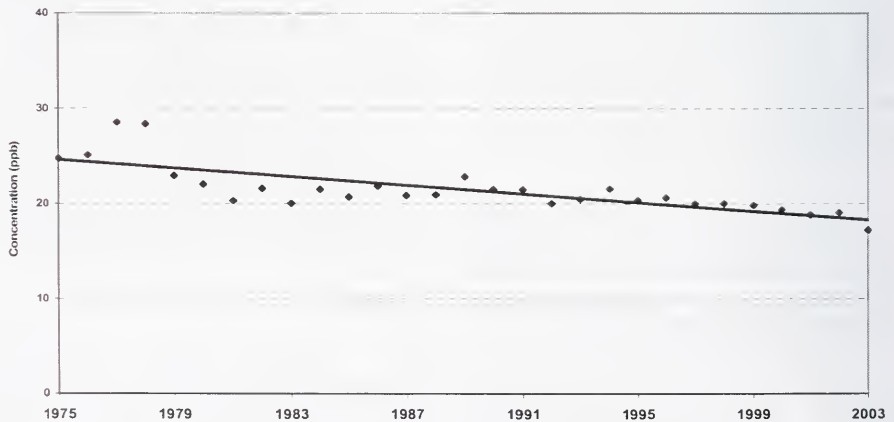
#### *Trends*

Provincial average ambient  $\text{NO}_2$  concentrations show a decreasing trend for the period 1975 to 2003 (Figure 4.2). Average concentrations decreased by 26 per cent from 1975 to 2003.

**Figure 4.1**  
**Nitrogen Dioxide Annual Means Across Ontario**  
**(2003)**



**Figure 4.2**  
**Trend of Nitrogen Dioxide Annual Means in Ontario**  
**(1975 - 2003)**



Note: Annual composite mean based on 11 ambient sites operated over 29 years.

### International perspective

Figure 4.3 displays the NO<sub>2</sub> annual mean concentrations in 2003 for 32 cities world-wide. Los Angeles, Sao Paulo and New York reported the highest NO<sub>2</sub> annual means of 33.0 ppb, 31.1 ppb and 30.0 ppb, respectively. Adelaide recorded the lowest NO<sub>2</sub> annual mean of 5.0 ppb. The annual U.S. NAAQS of 53 ppb was not exceeded at any of the cities examined in 2003. Large urban centres such as Los Angeles, Sao Paulo and New York typically experience higher NO<sub>2</sub> levels due to population density and increased motor vehicle emissions.

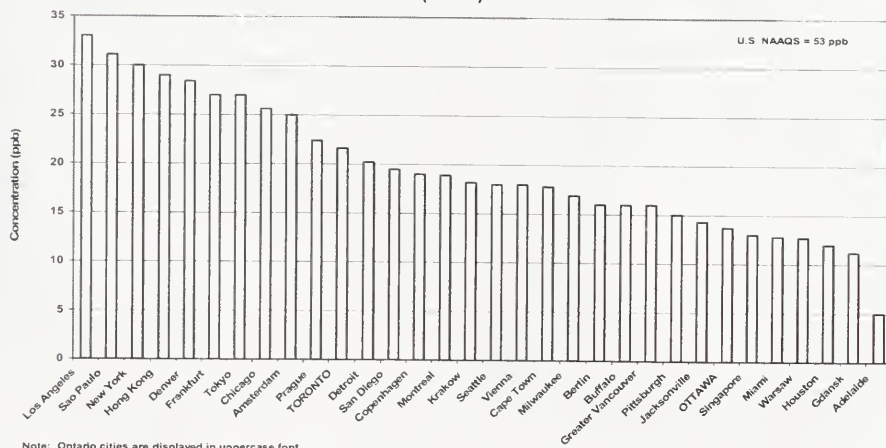
### CARBON MONOXIDE

#### Characteristics, sources and effects

Carbon monoxide (CO) is a colourless, odourless, tasteless and, at high concentrations, a poisonous gas. This gas can enter the bloodstream and reduce oxygen delivery to the organs and tissues. People with heart disease are particularly sensitive. Exposure to high CO levels is linked with the impairment of vision, work capacity, learning ability and performance of complex tasks.

Carbon monoxide is produced primarily by the incomplete combustion of fossil fuels. The transportation sector is the main source of CO emissions.

**Figure 4.3**  
**Nitrogen Dioxide Annual Means for Selected Cities World-wide (2003)**



### Monitoring results for 2003

Monitoring for CO was conducted at 19 ambient locations in 2003; 13 sites provided sufficient data for an annual mean. In 2003, the highest annual mean was 0.68 parts per million (ppm), recorded at the Brampton site. The highest one-hour maximum CO value (7.1 ppm) was measured at the Newmarket site (Figure 4.4). Mississauga recorded the highest eight-hour maximum value (3.3 ppm). Typically, the highest CO concentrations are recorded in large urban centres as a result of vehicle emissions. Ontario's one-hour (30 ppm) and eight-hour (13 ppm) ambient air quality

criteria for CO have not been exceeded at any of the monitoring sites in Ontario since 1991.

### Trends

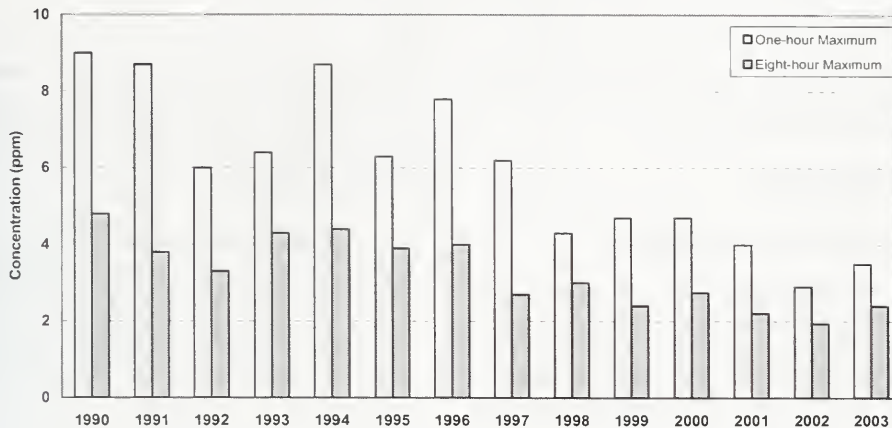
The trends in provincial averaged one-hour and eight-hour maximum CO concentrations for 1990 to 2003 are shown in Figure 4.5. Ambient CO concentrations, as measured by the composite average of the one and eight-hour maximums, decreased by 63 per cent and 55 per cent, respectively, over this 14-year period. The CO composite annual mean in 2003 was 26 per cent less than the corresponding 1994 composite mean.

**Figure 4.4**  
**Geographical Distribution of Carbon Monoxide One-Hour Maximum Concentrations Across Ontario (2003)**



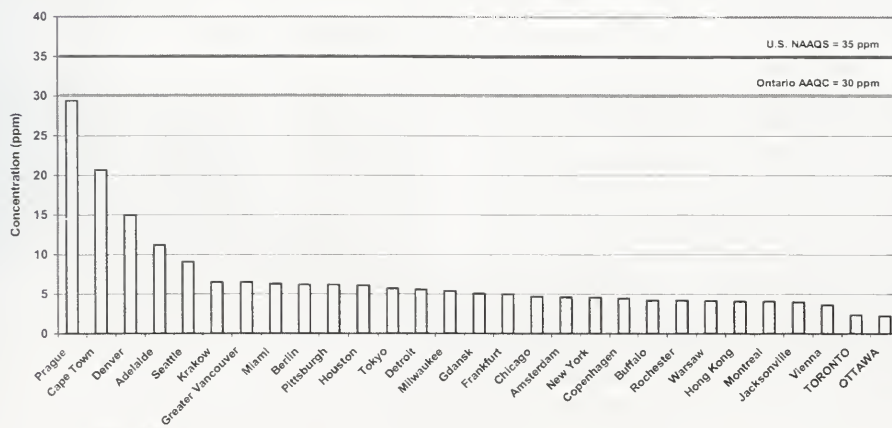
Note: One-hour Ontario AAQC = 30 ppm;  
Carbon monoxide concentrations are reported in parts per million (ppm).

**Figure 4.5**  
**Trends of Carbon Monoxide**  
**One-Hour and Eight-Hour Maximums in Ontario**  
**(1990 - 2003)**



Note: Data is based on 9 ambient CO sites operated over 14 years;  
 Ontario's one-hour AAQC = 30 ppm;  
 Ontario's eight-hour AAQC = 13 ppm.

**Figure 4.6**  
**Carbon Monoxide One-Hour Maximum Concentrations for Selected**  
**Cities World-wide**  
**(2003)**



Note: Ontario cities are displayed in uppercase font



### *International perspective*

Figure 4.6 displays the CO one-hour maximum concentrations in 2003 for 29 cities world-wide. Prague reported the highest CO one-hour maximum reaching 29 ppm. Toronto and Ottawa recorded the lowest CO maximums of less than 3 ppm. There were no exceedances of the Ontario AAQC of 30 ppm or the U.S. NAAQS of 35 ppm by any of the cities examined in 2003.

### **SULPHUR DIOXIDE**

#### *Characteristics, sources and effects*

Sulphur dioxide ( $\text{SO}_2$ ) is a colourless gas that smells like burnt matches. Sulphur dioxide can also be oxidized to form sulphuric acid aerosols. In addition, sulphur dioxide is a precursor to sulphates, which are one of the main components of airborne fine particulate matter.

Sulphur dioxide is emitted into the atmosphere from sources such as smelters, utilities, iron and steel mills, petroleum refineries, and pulp and paper mills. Lesser sources include transportation, residential, commercial and industrial space heating. The highest peak concentrations of  $\text{SO}_2$  historically have been recorded in the vicinity of large, industrial facilities.

Health effects caused by exposure to high levels of  $\text{SO}_2$  include breathing problems, respiratory illness, changes in the lung's defences, and worsening respiratory and cardiovascular disease. People with asthma, chronic lung disease or heart disease are the most sensitive to  $\text{SO}_2$ . Sulphur dioxide also damages trees and crops. Sulphur dioxide and  $\text{NO}_2$  are the main precursors of acid rain, which contributes to the acidification of lakes and streams, accelerated corrosion of buildings, and reduced visibility. Sulphur dioxide also causes the formation of microscopic acid aerosols, which have serious health implications and contribute to climate change.

### *Monitoring results for 2003*

Sulphur dioxide was monitored at 24 ambient locations in 2003; 18 sites provided sufficient data for the analysis presented here. Sarnia recorded the highest annual mean (7.1 ppb) and 24-hour maximum concentration (63 ppb) during 2003. The Sudbury site located at Science North, recorded the highest one-hour concentration (226 ppb). The provincial one-hour criterion (250 ppb) and 24-hour criterion (100 ppb) for  $\text{SO}_2$  were not exceeded at any ambient sites in 2003.

Figure 4.7 shows the  $\text{SO}_2$  annual means at ambient sites across Ontario. Sarnia recorded the highest annual mean in 2003. The annual levels across the province ranged from a low of 0.6 ppb in Thunder Bay to a high of 7.1 ppb in Sarnia. The annual criterion of 20 ppb for  $\text{SO}_2$  was not exceeded at any site in Ontario during 2003.

#### *Trends*

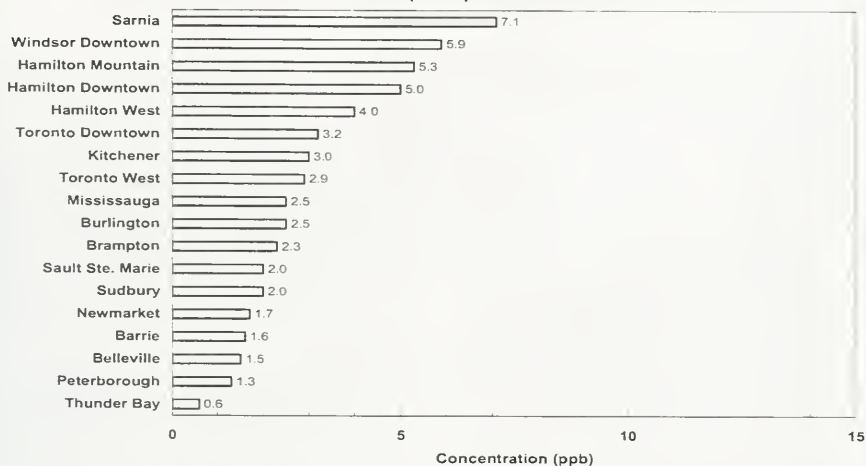
In 2003, average ambient  $\text{SO}_2$  concentrations in the province were approximately 86 per cent lower than levels reported in 1971 (Figure 4.8). Control orders on smelting operations, and the Countdown Acid Rain program resulted in significant decreases of  $\text{SO}_2$  emissions prior to the early 1990s.

### *International perspective*

Figure 4.9 displays the  $\text{SO}_2$  annual mean concentrations in 2003 for 32 cities world-wide. New York reported the highest annual mean (10 ppb). Adelaide recorded the lowest  $\text{SO}_2$  annual mean of 1 ppb in 2003. All cities examined here were below the Ontario annual AAQC of 20 ppb and the U.S. annual NAAQS of 30 ppb.

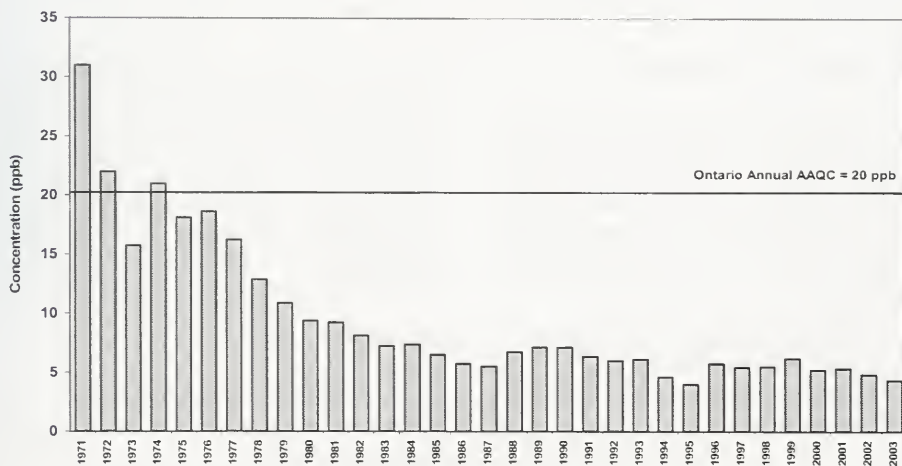


**Figure 4.7**  
**Sulphur Dioxide Annual Means Across Ontario**  
**(2003)**



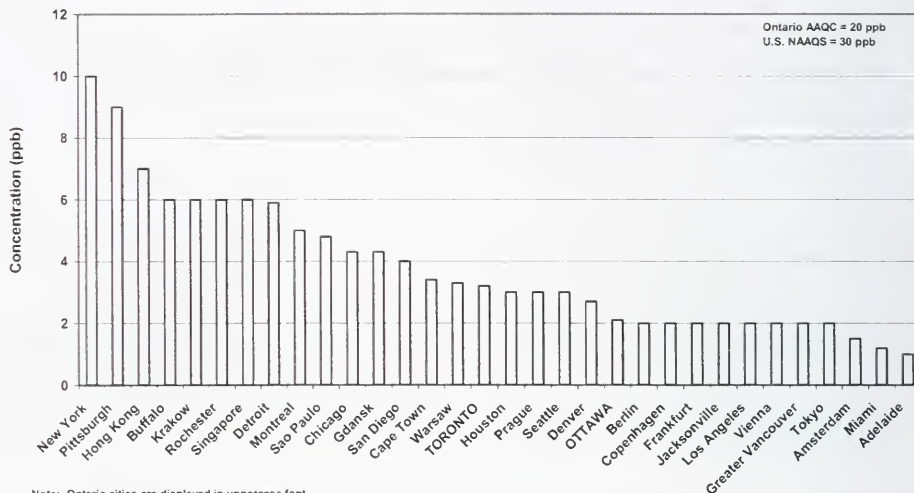
Note: Data from ambient sites:  
 Ontario annual AAQC for sulphur dioxide is 20 ppb.

**Figure 4.8**  
**33-Year Trend of Sulphur Dioxide Concentrations in Ontario**  
**(1971 - 2003)**



Note: Annual composite mean based on 8 ambient SO<sub>2</sub> sites operated over 33 years.

**Figure 4.9**  
**Sulphur Dioxide Annual Means for Selected Cities World-wide**  
**(2003)**



## **TOTAL REDUCED SULPHUR COMPOUNDS**

### *Characteristics, sources and effects*

Total reduced sulphur (TRS) compounds produce an offensive odour similar to rotten eggs or decomposed cabbage. Industrial sources of TRS compounds include the steel industry, pulp and paper mills, crude oil refineries and sewage treatment facilities. Natural sources include swamps, bogs and marshes.

Total reduced sulphur compounds are not normally considered a health hazard. They are, however, a primary cause of nuisance odours at some locations in the province.

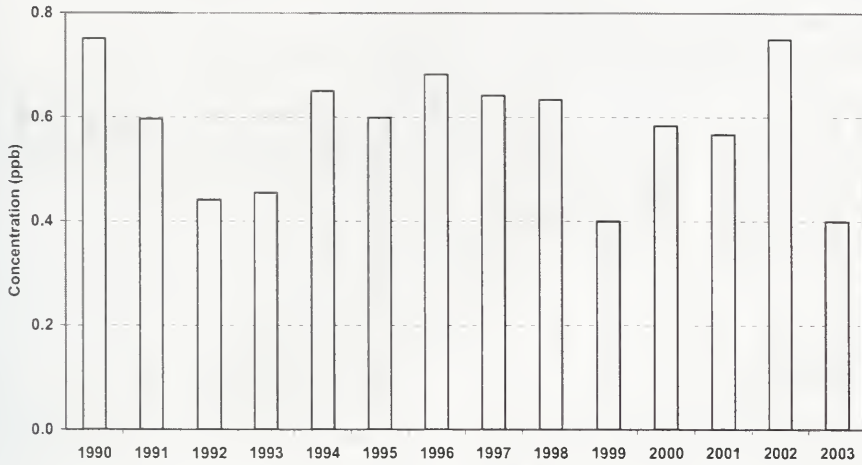
### *Monitoring results for 2003*

Monitoring for TRS compounds was conducted at eight ambient locations in 2003; four sites provided sufficient data for an annual mean. The highest TRS annual mean (0.7 ppb) was recorded at the Sarnia air monitoring site. Of the eight TRS monitoring sites, Oakville had the greatest number of hours (3) above the AAQC of 27 ppb and the maximum one-hour TRS concentration (74 ppb) in 2003.

### *Trends*

Provincial TRS annual mean concentrations at ambient monitoring sites from 1990 to 2003 are displayed in Figure 4.10. No trend was noted in the provincial means of ambient TRS levels shown over the last 14 years.

Figure 4.10  
Total Reduced Sulphur Compounds Annual Means in Ontario  
(1990 - 2003)



Note: Annual composite mean based on six ambient total reduced sulphur sites operated over 14 years.

## Chapter 5

# Air Quality Indices, Smog Alert Program and Smog Episodes

### *Air Quality Indices*

The Ministry of the Environment operates an extensive network of air quality monitoring sites across the province. In 2003, 37 of these sites in 24 urban centres and seven rural areas formed the basis of the Air Quality Index (AQI) network. This includes Belleville which was added to the AQI network in 2003. The Air Quality Office of the Environmental Monitoring and Reporting Branch continually obtains data for several criteria pollutants from these 37 sites.

The AQI network, shown in Figure 5.1, provides the public with air quality information, in near real-time, from across the province. The AQI is based on pollutants that have adverse effects on human health and the environment. The pollutants are ozone ( $O_3$ ), fine particulate matter ( $PM_{2.5}$ ), nitrogen dioxide ( $NO_2$ ), carbon monoxide (CO), sulphur dioxide ( $SO_2$ ), and total reduced sulphur (TRS) compounds. At the end of each hour, the concentration of each pollutant measured at a

particular site is converted into a number ranging from 1 upwards using a common scale or index. The calculated number for each pollutant is called a sub-index.

At a given site, the highest sub-index for any given hour becomes the AQI reading. The index is a relative scale, in that, the lower the index, the better the air quality. The index values, corresponding categories and potential health and environmental effects, are shown in Table 5.1.

If the AQI value is below 32, the air quality is categorized as good. For AQI values in the 32-49 range (moderate category), there may be some adverse effects on very sensitive people. For index values in the 50-99 range (poor category), the air quality may have adverse effects on sensitive members of human and animal populations, and may cause significant damage to vegetation and property. With an AQI value of 100 or more (very poor category), the air quality may have adverse effects for a large proportion of those exposed.

**Figure 5.1**  
**Air Quality Index Monitoring Sites in Ontario**  
**(2003)**



**Table 5.1: Air Quality Index Pollutants and Their Impacts**

| Index    | Category  | Ozone (O <sub>3</sub> )  | Fine Particulate Matter (PM <sub>2.5</sub> )   | Nitrogen Dioxide (NO <sub>2</sub> )   | Carbon Monoxide (CO)  | Sulphur Dioxide (SO <sub>2</sub> )                           | Total Reduced Sulphur (TRS) Compounds                         |
|----------|-----------|--|--|---|---|--|---|
| 1-15     | Very good | No known harmful effects   | Sensitive populations may want to exercise caution   | No known harmful effects  | No known harmful effects  | No known harmful effects                                     | No known harmful effects                                      |
| 16-31    | Good      | No known harmful effects   | Sensitive populations may want to exercise caution   | Slight odour  | No known harmful effects  | Damages some vegetation in combination with ozone            | Slight odour  |
| 32-49    | Moderate  | Respiratory irritation in sensitive people during vigorous exercise; people with heart/lung disorders at some risk; damages very sensitive plants                                | People with respiratory disease at some risk   | Odour   | Blood chemistry changes, but no noticeable impairment                                 | Damages some vegetation                                      | Odour   |
| 50-99    | Poor      | Sensitive people may experience irritation when breathing and possible lung damage when physically active; people with heart/lung disorders at greater risk; damages some plants | People with respiratory disease should limit prolonged exertion; general population at some risk   | Air smells and looks brown. Some increase in bronchial reactivity in people with asthma | Increased symptoms in smokers with heart disease                                      | Odorous; increasing vegetation damage                        | Strong odour  |
| 100-over | Very poor | Serious respiratory effects, even during light physical activity; people with heart/lung disorders at high risk; more vegetation damage  | Serious respiratory effects even during light physical activity; people with heart disease, the elderly and children at high risk; increased risk for general population | Increasing sensitivity for people with asthma and bronchitis                            | Increasing symptoms in non-smokers with heart disease; blurred vision; some dizziness | Increasing sensitivity for people with asthma and bronchitis | Severe odour; some people may experience nausea and headaches |

Computed air quality indices, or AQI values, and air quality forecasts are released to the public and news media at set times each day. The public can access the index values by calling the ministry's air quality information Integrated Voice Response (IVR), English recording: 1-800-387-7768, or in Toronto, 416-246-0411, and French recording: 1-800-221-8852. The AQI values can also be obtained from the ministry's Web site: [www.airqualityontario.com](http://www.airqualityontario.com). Air quality forecasts, based on regional meteorological conditions and current pollution levels in Ontario and bordering U.S. states, are also provided daily on this Web site.

Table 5.2 shows the percentage distribution of hourly AQI values for the 37 monitoring sites by the AQI descriptive category and the pollutant responsible for the AQI above 49. On average, the AQI sites in 2003 reported air quality in the good and very good categories approximately 90 per cent of the time and moderate to poor air quality about 10 per cent of the time. However, air quality in the very good to good categories recorded at individual sites ranged from approximately 83 per cent at Port Stanley, a rural site on the northern shore of Lake Erie, to 96 per cent at Thunder Bay. There were no hours of very poor air quality recorded at air quality index sites in Ontario during 2003.

**Table 5.2: Air Quality Index Summary (2003)**

| Station ID | City/Town         | Percentage of Valid Hours AQI in Range |       |          |       |           | Valid Hours | Percentage of Valid Hours Pollutant Responsible for AQI > 49 |                   |                 |    |                 |     | No. of Days At Least 1h AQI > 49 |
|------------|-------------------|--|-------|----------|-------|-----------|-------------|--|-------------------|-----------------|----|-----------------|-----|----------------------------------|
|            |                   | Very Good                              | Good  | Moderate | Poor  | Very Poor |             | O <sub>3</sub>   | PM <sub>2.5</sub> | NO <sub>2</sub> | CO | SO <sub>2</sub> | TRS |                                  |
|            |                   | 0-15                                   | 16-31 | 32-49    | 50-99 | 100+      |             | <1   | <1                | 0               | 0  | 0               | 0   |                                  |
| 12008      | WINDSOR DOWNTOWN  | 45.0                                   | 43.7  | 10.1     | 1.2   | 0.0       | 8575        | <1   | <1                | 0               | 0  | 0               | X   | 17                               |
| 12016      | WINDSOR WEST      | 44.0                                   | 43.0  | 11.6     | 1.4   | 0.0       | 8728        | 1.0  | <1                | 0               | X  | 0               | 0   | 18                               |
| 13021      | MERLIN            | 33.2                                   | 52.8  | 12.6     | 1.4   | 0.0       | 7118        | 1.2  | <1                | X               | X  | X               | X   | 20                               |
| 14064      | SARNIA            | 27.3                                   | 59.3  | 11.8     | 1.5   | 0.0       | 8469        | <1   | 1.2               | 0               | X  | 0               | 0   | 20                               |
| 15020      | GRAND BEND        | 28.1                                   | 62.8  | 8.3      | 0.8   | 0.0       | 8585        | <1   | <1                | X               | X  | X               | X   | 12                               |
| 15025      | LONDON            | 34.1                                   | 53.2  | 11.7     | 1.0   | 0.0       | 8671        | <1   | <1                | 0               | 0  | 0               | X   | 17                               |
| 16015      | PORT STANLEY      | 20.0                                   | 63.4  | 14.8     | 1.8   | 0.0       | 8539        | 1.5  | <1                | X               | X  | X               | X   | 23                               |
| 18007      | TIVERTON          | 21.0                                   | 67.6  | 10.4     | 1.0   | 0.0       | 8453        | <1   | <1                | X               | X  | X               | X   | 13                               |
| 22071      | SIMCOE            | 22.1                                   | 62.7  | 13.7     | 1.5   | 0.0       | 8474        | 1.4  | <1                | 0               | X  | X               | X   | 18                               |
| 26060      | KITCHENER         | 31.6                                   | 56.1  | 11.2     | 1.1   | 0.0       | 8693        | <1   | <1                | 0               | 0  | 0               | X   | 15                               |
| 27067      | ST. CATHARINES    | 40.2                                   | 49.5  | 9.4      | 0.9   | 0.0       | 8725        | <1   | <1                | 0               | 0  | 0               | X   | 9                                |
| 28028      | GUELPH            | 42.2                                   | 51.0  | 6.1      | 0.7   | 0.0       | 8516        | <1   | <1                | 0               | X  | X               | X   | 8                                |
| 29000      | HAMILTON DOWNTOWN | 41.2                                   | 45.6  | 12.0     | 1.1   | 0.0       | 8704        | <1   | <1                | 0               | 0  | 0               | 0   | 22                               |
| 29114      | HAMILTON MOUNTAIN | 28.9                                   | 56.5  | 13.0     | 1.6   | 0.0       | 8604        | <1   | <1                | 0               | X  | 0               | 0   | 19                               |
| 29118      | HAMILTON WEST     | 45.5                                   | 45.1  | 8.5      | 1.0   | 0.0       | 8714        | <1   | <1                | 0               | 0  | 0               | 0   | 17                               |
| 31103      | TORONTO DOWNTOWN  | 45.0                                   | 45.3  | 8.4      | 1.1   | 0.0       | 8682        | <1   | <1                | 0               | 0  | 0               | X   | 12                               |
| 33003      | TORONTO EAST      | 45.8                                   | 45.3  | 8.0      | 0.9   | 0.0       | 8650        | <1   | <1                | 0               | 0  | 0               | X   | 12                               |
| 34020      | TORONTO NORTH     | 39.2                                   | 51.9  | 7.8      | 0.9   | 0.0       | 8607        | <1   | <1                | 0               | X  | X               | X   | 11                               |
| 35125      | TORONTO WEST      | 50.6                                   | 40.3  | 8.4      | 0.8   | 0.0       | 8700        | <1   | <1                | 0               | 0  | 0               | X   | 15                               |
| 44008      | BURLINGTON        | 42.5                                   | 48.5  | 8.1      | 0.8   | 0.0       | 8668        | <1   | <1                | 0               | 0  | 0               | X   | 11                               |
| 44017      | OAKVILLE          | 37.4                                   | 51.0  | 10.1     | 1.5   | 0.0       | 8725        | <1   | <1                | 0               | 0  | 0               | <1  | 22                               |
| 45025      | OSHAWA            | 38.2                                   | 55.3  | 5.7      | 0.8   | 0.0       | 8710        | <1   | <1                | 0               | X  | X               | X   | 10                               |
| 46089      | BRAMPTON          | 35.6                                   | 54.2  | 9.2      | 1.0   | 0.0       | 8716        | <1   | <1                | 0               | 0  | 0               | X   | 13                               |
| 46110      | MISSISSAUGA       | 42.7                                   | 48.0  | 8.4      | 0.9   | 0.0       | 8667        | <1   | <1                | 0               | 0  | 0               | X   | 13                               |
| 47045      | BARRIE            | 42.2                                   | 50.3  | 7.0      | 0.5   | 0.0       | 8688        | <1   | <1                | 0               | 0  | 0               | X   | 5                                |
| 48006      | NEWMARKET         | 27.5                                   | 62.5  | 9.2      | 0.8   | 0.0       | 8706        | <1   | <1                | 0               | 0  | 0               | X   | 10                               |
| 49005      | PARRY SOUND       | 31.9                                   | 57.0  | 10.2     | 1.0   | 0.0       | 6503        | <1   | <1                | X               | X  | X               | X   | 10                               |
| 49010      | DORSET            | 30.4                                   | 62.2  | 7.3      | 0.2   | 0.0       | 8414        | <1   | <1                | X               | X  | X               | X   | 5                                |
| 51001      | OTTAWA            | 40.0                                   | 52.4  | 7.3      | 0.3   | 0.0       | 8317        | <1   | <1                | 0               | 0  | 0               | X   | 5                                |
| 52020      | KINGSTON          | 40.4                                   | 50.9  | 7.9      | 0.7   | 0.0       | 8703        | <1   | <1                | X               | X  | X               | X   | 11                               |
| 54012      | BELLEVILLE        | 31.7                                   | 56.6  | 10.4     | 1.2   | 0.0       | 8683        | 1.2  | <1                | 0               | 0  | 0               | X   | 15                               |
| 56051      | CORNWALL          | 37.4                                   | 54.3  | 7.6      | 0.7   | 0.0       | 8620        | <1   | <1                | X               | X  | X               | X   | 8                                |
| 59006      | PETERBOROUGH      | 29.4                                   | 61.4  | 8.3      | 0.8   | 0.0       | 8720        | <1   | <1                | 0               | 0  | 0               | X   | 11                               |
| 63200      | THUNDER BAY       | 39.6                                   | 56.3  | 4.1      | 0.0   | 0.0       | 8732        | 0  | <1                | 0               | 0  | 0               | 0   | 1                                |
| 71068      | SAULT STE. MARIE  | 45.3                                   | 47.6  | 7.1      | 0.1   | 0.0       | 8713        | <1   | <1                | 0               | X  | 0               | 0   | 4                                |
| 75010      | NORTH BAY         | 37.2                                   | 56.9  | 5.7      | 0.3   | 0.0       | 8597        | <1   | <1                | 0               | X  | X               | X   | 7                                |
| 77203      | SUDBURY           | 36.0                                   | 58.8  | 4.9      | 0.3   | 0.0       | 8674        | <1   | X                 | 0               | 0  | 0               | X   | 5                                |



Figure 5.2 shows the composite pie diagrams of the percentages of very good, good, moderate and poor air quality recorded at sites across the province. The pie diagram on the left shows category percentages. The diagram on the right breaks down the poor air quality slice into percentages of pollutants associated with the AQI above 49. Ozone accounted for 63.1 per cent of the number of poor air quality hours recorded during 2003 at the AQI sites and PM<sub>2.5</sub> accounted for 36.8 per cent. Total reduced sulphur compounds accounted for less than 1 per cent of the poor air quality values.

### ***Smog alert program***

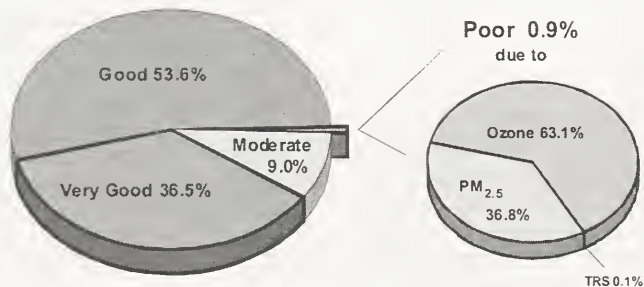
The ministry began issuing smog advisories in 1993 under the Air Quality Advisory program. The program was revised in 1995, and then expanded to the Smog Alert program in 2000. The program is a joint effort between the Ontario Ministry of the Environment and Environment Canada. Smog advisories are issued to the public when widespread, elevated and persistent smog levels are forecast to occur within the next 24 hours, *or* if elevated smog conditions occur without warning and weather conditions conducive to elevated smog levels are forecast to continue for several hours. The smog

advisory program covers southern, eastern and central Ontario where ozone levels are most likely to exceed the one-hour AAQC of 80 ppb and PM<sub>2.5</sub> levels of 45 µg/m<sup>3</sup> three-hour running average.

The Smog Alert program provides Ontarians with improved reporting through comprehensive and timely air quality readings and forecasts, and includes the following:

- A two-level air quality forecast that provides a three-day outlook known as a smog watch, in addition to the current 24-hour smog advisory;
- A Smog Watch is called when there is a 50 per cent chance that widespread, elevated and persistent smog levels are forecast within the next three days;
- A Smog Advisory is called when there is a strong likelihood that widespread elevated and persistent smog levels are forecast within the next 24 hours;
- If widespread, elevated smog levels occur without warning and weather conditions conducive to the persistence of such levels are forecast to continue for several hours, then a smog advisory is issued immediately;

**Figure 5.2**  
**Air Quality Index Summary**  
**(2003)**



- A public Web site [www.airqualityontario.com](http://www.airqualityontario.com), where current AQI readings, smog forecasts and other air quality information are available;
- Direct e-mails of smog alerts to subscribers of the ministry's Smog Alert network at the above Web site;
- Reporting of AQI at rural sites impacted by transboundary smog; and
- Toll-free numbers by which anyone at anytime can get updated information on the air quality (1-800-387-7768 in English and 1-800-221-8852 in French).

### *Co-operative activities with Michigan and Quebec*

Since May 2000, during the traditional smog season from May to September, air quality and meteorological discussions between Michigan and Ontario meteorologists are held twice per week or more frequently if there is potential for a smog advisory in Ontario or an ozone action day in Michigan. Although ozone action days in Michigan and smog advisories in Ontario are not linked to the same air quality standards, the weather conditions conducive to high levels of smog are often common to both airsheds, particularly in the Detroit-Windsor area.

The issuances of smog advisories in Ontario and in Quebec under their Info-Smog program during the smog season are also harmonized through discussions when required between Ontario meteorologists and the Meteorological Services of Canada, Quebec Region meteorologists for border regions such as Ottawa, Ontario and Gatineau, Quebec.

### *2003 smog advisories*

For the 2003 traditional smog season (May 1 to September 30 inclusive), Ontarians experienced 6 smog advisories covering 17 days, and for the entire year, 7 smog advisories covering 19 days. Outside of the traditional smog season, a two-day smog advisory due to fine particulate matter was issued for the first time. This occurred on October 10 and 11, 2003, and

was confined only to the Hamilton area. Of the smog advisories issued in 2003, the first one was a five-day event, covering June 22-26, 2003. This was followed by a four-day episode, July 1 to July 4 inclusive, and five two-day events (July 25-26, July 31-August 1, August 14-15, August 20-21 and October 10-11).

The number of smog advisory days in 2003 was lower than that of the previous two years which had summers that were relatively hot and dry. For the province as a whole, there were 23 smog advisory days in 2001 and 27 such days in 2002. Near seasonal weather conditions prevailed over much of southern Ontario during summer 2003 and this was reflected in the number of days that smog advisories were issued. In contrast, the cool and wet summer of 2000 had only 4 smog advisory days for the entire province. A history of smog advisories and smog advisory days since 2000 is shown in Figure 5.3.

### *2003 smog episodes*

Summer smog episodes in Ontario are often a part of a regional weather condition that prevails over much of northeastern North America. Elevated levels of ozone and PM<sub>2.5</sub> are typically due to weather patterns that affect the lower Great Lakes region. Such weather patterns are invariably associated with slow moving high pressure cells across the region and result in the long-range transport of smog pollutants from neighbouring U.S. industrial and urbanized states during warm south to southwesterly air flow conditions.

The first smog episode of 2003 occurred somewhat later in the season, during the period June 22 and 26, 2003. It was one of the most persistent and widespread smog events in recent years. Hot, sunny conditions with light southerly winds blowing air pollution from the U.S. into the province began to impact the extreme south-western regions on June 22, and this resulted in elevated smog levels in areas as far north as Sault Ste. Marie. On June 23, the hot, muggy and polluted air expanded into the Greater



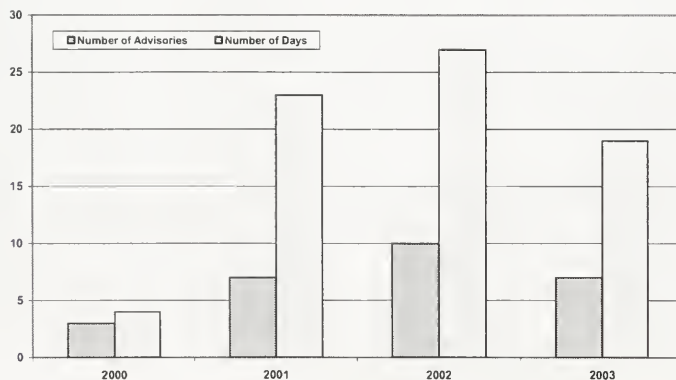
Toronto Area and as far north as North Bay and Sudbury. This continued over the next three days, June 24, 25 and 26, with elevated smog levels over most of southern, eastern and northern regions. Relief came on the night of June 26 as a cold front moved across the impacted areas, bringing clouds, showers and thunderstorms, and resulted in cleaner air on June 27. The maximum one-hour ozone level on June 22 was 90 ppb, and this occurred in Windsor. On June 23, the maximum one-hour ozone level was 129 ppb at Port Stanley on the northern shore of Lake Erie. On June 24 and June 25, the maximum one-hour ozone levels of 146 ppb and 149 ppb respectively occurred at Belleville on the north shore of Lake Ontario. On June 26, the maximum one-hour ozone level was 118 ppb and this occurred at Peterborough.

In this episode, three AQI sites reported poor air quality, all due to ozone, on June 22. A total of 21 AQI sites reported poor air quality on June 23 (19 had elevated ozone levels and 2 had elevated fine particulate matter). On June 24 and 25, 35 of the 37 AQI sites in the province reported poor air quality (34 had elevated ozone levels and one fine particulate matter on June 24, and 35 had elevated ozone levels and 16 fine particulate matter on June 25). On the

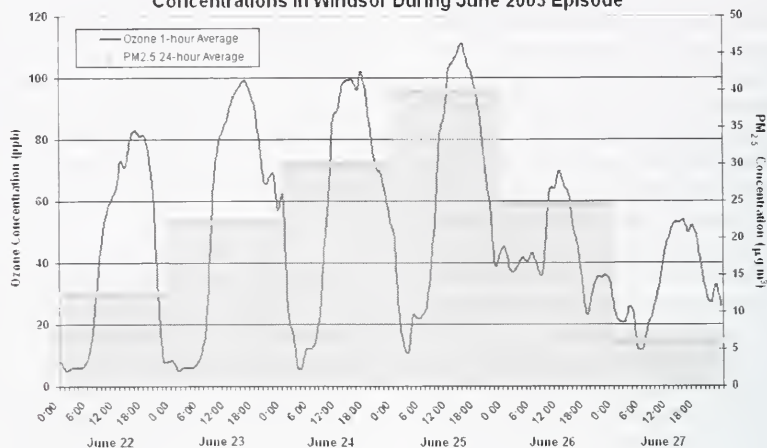
last day of the episode, 32 AQI sites reported poor air quality (31 with elevated ozone and 29 with elevated fine particulate matter). Figure 5.4 illustrates the time history of ozone and fine particulate matter during this multi-day episode for Windsor. The one hour ozone criterion of 80 ppb was exceeded on the first four days of the episode, June 22 to June 25 inclusive. As the air mass aged, fine particulate matter levels gradually increased each day during the episode and exceeded the  $PM_{2.5}$  reference level of  $30 \mu\text{g}/\text{m}^3$  for a 24-hour period (based on CWS) on June 24 and 25.

The North American electrical blackout during August 14 and 15, 2003 was also noteworthy here in Ontario as it occurred during a period of anticipated elevated smog conditions. The electrical blackout which began on the afternoon of August 14, 2003 a strong high pressure over the Great Lakes region provided quasi-stationary conditions and the build-up of pollutants over areas of south-western Ontario. Accordingly, a smog advisory was issued early that afternoon for the Windsor-Essex-Chatham-Kent area just prior to the electrical blackout. Ozone levels that afternoon in Windsor reached a peak value of 86 ppb. On the following day, August 15, elevated levels of ozone were recorded at a number of sites

Figure 5.3  
Summary of Smog Advisories Issued  
(2000 - 2003)



**Figure 5.4**  
**One-Hour Average Ozone Concentrations and 24-Hour Average PM<sub>2.5</sub>**  
**Concentrations in Windsor During June 2003 Episode**

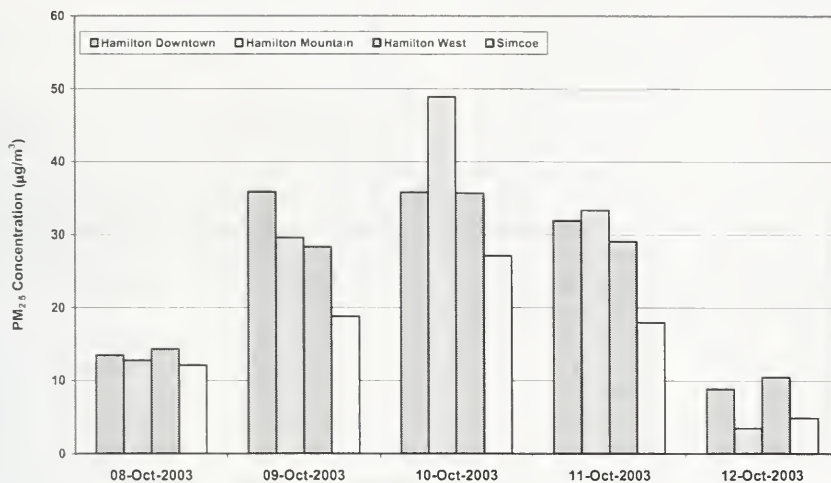


across Ontario – maximum hourly values of 81 ppb at Simcoe, 84 ppb at Oakville, 113 ppb at Belleville and 82 ppb at Kingston. Increased cloudiness along with unstable and unsettled weather conditions prevailed by August 16 and resulted in cleaner air, and a termination of the smog advisory. The fact that widespread poor air quality was observed over southern Ontario in both urban and rural locations on August 15 despite the electrical blackout, reduction of industrial activities and air emissions in Ontario suggests that trans-boundary pollution may still have been significant on that day. Under normal conditions (i.e. no blackout), air quality levels in Ontario would have likely been worse on August 15.

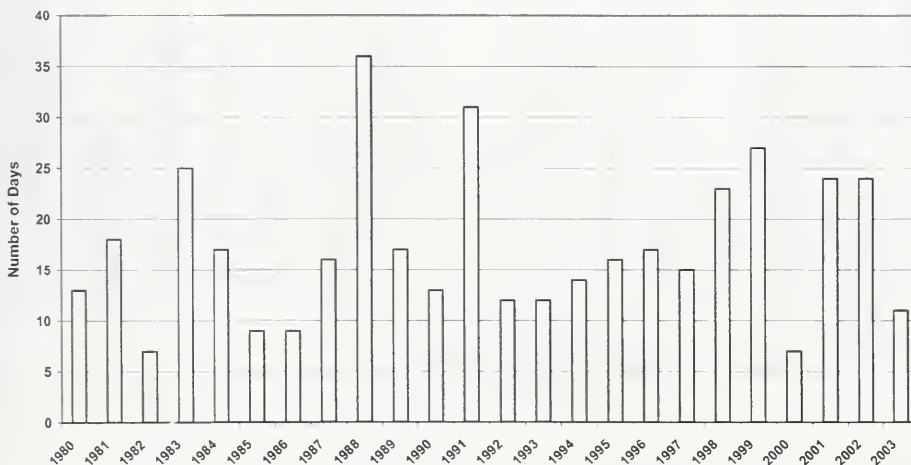
The fine particulate smog episode outside of the traditional smog season occurred on October 9, 10 and 11, and was confined to the Hamilton area. A high pressure ridge over southern Ontario resulted in very light winds and stagnant weather conditions, and allowed the local build-up of pollutants in Hamilton both below and above the escarpment. Figure 5.5 shows the build-up of fine particulate matter on

October 9, 10 and 11 at Hamilton Downtown, Hamilton West and Hamilton Mountain. Relief occurred on the afternoon of October 11 when the high pressure system influencing the weather slowly moved eastward and good mixing of the air brought cleaner conditions to Hamilton. The fine particulate matter levels at the nearby rural site in Simcoe are also shown in Figure 5.5. This provides a measure of background levels in the surrounding area and how much additional burden was provided locally by Hamilton sources during this episode. On October 9, 2003, fine particulate matter levels in Hamilton ranged from 28.3 to 35.8  $\mu\text{g}/\text{m}^3$  (24 hour average) while Simcoe reported 18.8  $\mu\text{g}/\text{m}^3$ . On October 10, PM<sub>2.5</sub> levels ranged from 35.7 to 48.9  $\mu\text{g}/\text{m}^3$  (24 hour average) in Hamilton while Simcoe recorded 27.1  $\mu\text{g}/\text{m}^3$  and on October 11, PM<sub>2.5</sub> ranged from 29.1 to 33.4  $\mu\text{g}/\text{m}^3$  (24 hour average) in Hamilton while Simcoe recorded 18.0  $\mu\text{g}/\text{m}^3$ . These results suggest a local contribution of about 40% to the observed levels in Hamilton during this episode.

**Figure 5.5**  
**24-Hour Average PM<sub>2.5</sub> Concentrations in Hamilton and Simcoe during**  
**October 2003 Episode**



**Figure 5.6**  
**Number of Ozone "Episode Days" in Ontario**  
**(1980 - 2003)**

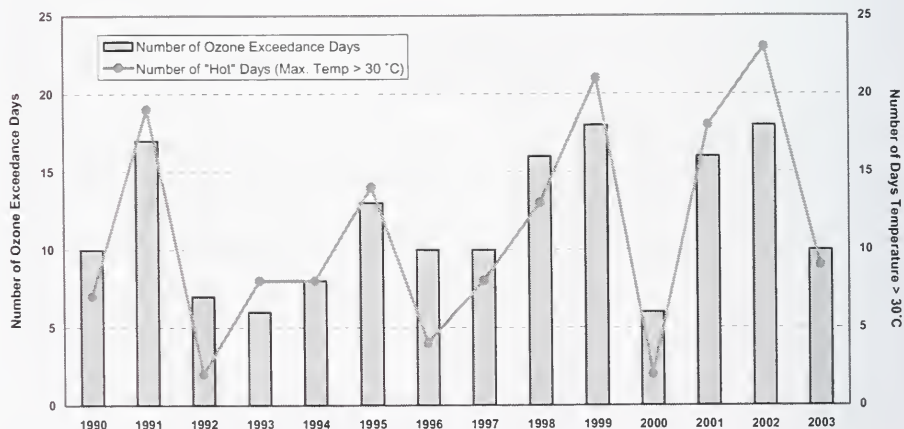


### *Trends in ozone smog episodes*

Smog episodes are highly dependent upon weather conditions which vary from year to year. To depict the trend in Ontario, the number of ozone "episode days" (i.e. characterized by days with widespread ozone levels greater than 80 ppb) have been assembled for the period 1980 to 2003 (Figure 5.6). Smog episode days were highest in 1988, a summer which was notably hot across eastern North America and lowest in 1982 and 2000, summers which were relatively cool and wet. Other years such as 1983, 1991, 1998, 1999, 2001 and 2002 were also relatively hot and dry summers and resulted in above normal number of smog episode days. Figure 5.7 also

provides another way of examining the smog episode trend in Ontario. It shows the distribution of the province-wide ozone exceedance days (at least one hour > 80 ppb) and the number of hot days (those days with maximum air temperatures greater than 30°C) from 1990 to 2003. The high number of ozone exceedance days in 1991, 1998, 1999, 2001 and 2002 can be largely attributed to the relatively high number of "hot" days which are favourable to the formation and transport of ozone, whereas the low numbers of exceedance days in 2000 reflect conditions less conducive to the production of ground-level ozone. From these results, there are no apparent trends in elevated regional smog levels in Ontario.

**Figure 5.7**  
**Trend for Ozone Exceedance Days and 'Hot' Days in Ontario**  
**(1990 - 2003)**



Note: Based on 21 ozone sites operated over 14 years;  
"Hot" days based on eight meteorological sites operated over 14 years;  
An ozone exceedance day has at least one hour > 80 ppb.

# Chapter 6

## Air Toxics – Selected VOCs

### *Sources, characteristics and effects*

Volatile organic compounds are emitted into the atmosphere from a variety of anthropogenic and natural sources. Some of the major anthropogenic sources include vehicles, fossil fuel combustion, steel-making, petroleum refining, fuel-refilling, industrial and residential solvent use, paint application, manufacturing of synthetic materials (e.g. plastics, carpets), food processing, agricultural activities and wood processing and wood burning. Vegetation sources are the main contributor of natural VOC emissions.

Certain volatile organic compounds (VOCs) warrant special concern because they play an important role in the formation of ground-level ozone and PM<sub>2.5</sub>. Volatile organic compounds that contribute to the formation of ozone typically have a short life span in the atmosphere. In contrast, VOCs that are least reactive to ozone formation are capable of being transported very long distances as they have a long half-life in the troposphere.

### *VOC monitoring*

Specialized, non-routine monitoring and analytical techniques are required to measure VOCs because they are usually present in the atmosphere at ultra-trace concentrations. Volatile organic compound samples are collected by drawing ambient air into evacuated, specially coated, stainless steel

canisters over a 24-hour period (midnight to midnight), following the National Air Pollution Surveillance (NAPS) sampling schedule (every sixth day) for urban sites. Volatile organic compound samples at rural sites are usually collected every three days. Concentrations for 143 pre-selected VOCs are reported for each sample. The list of 143 selected VOCs and their statistics appear in the attached Appendix.

For purposes of this report, data from 1994 to 2003 for eight ambient monitoring stations (Windsor, Sarnia, Longwoods, Hamilton, Simcoe, Egbert, Stouffville and Ottawa) are included in this discussion. The monitoring sites described in this report are displayed in Figure 6.1. Data from these sites are provided by Environment Canada as part of a co-operative federal-provincial program under NAPS.

### *Benzene, toluene and xylene (BTX)*

Benzene, a volatile aromatic hydrocarbon which has a strong, often pleasant scent, is primarily used in the production of plastics and other chemical products. Large quantities of benzene are obtained from petroleum, either by direct extraction from certain types of crude oils or by chemical treatment of gasoline. Benzene is classified as a human carcinogen.

Toluene is an aromatic hydrocarbon that is used to make chemicals, explosives, dyes and many other compounds. It is used as a solvent for inks,

paints, lacquers, resins, cleaners, glues and adhesives. Toluene is found in gasoline and aviation fuel. Studies reveal that toluene affects the central nervous system of humans and animals; however, there is little evidence to classify it as a carcinogen.

Like benzene and toluene, xylene is an aromatic hydrocarbon. Xylene is a mixture of three isomers (ortho [o-xylene], meta [m-xylene] and para [p-xylene]). It is also referred to as mixed xylenes. Xylene is produced from petroleum and coal tar and is naturally formed during forest fires. Xylene is used as a solvent and in the printing, rubber, and leather industries, and as a cleaning agent, paint thinner and in paints and varnishes. Xylene is a central nervous system depressant. Xylene has not been classified as a carcinogen.

Motor vehicle exhaust is the major source of BTX in Ontario. These compounds are very reactive

in forming ground-level ozone and  $PM_{2.5}$ . In 2003, the annual mean concentrations for benzene, toluene and xylenes were  $1.05 \mu\text{g}/\text{m}^3$ ,  $2.55 \mu\text{g}/\text{m}^3$  and  $1.35 \mu\text{g}/\text{m}^3$ , respectively. Figure 6.2 shows trends of benzene, toluene, and xylenes for the period from 1994 to 2003. All three VOCs show decreasing trends over the ten-year period. The decline in BTX concentrations can be partially attributed to *The Benzene in Gasoline Regulations*, effective July 1, 1999, which recommends that the benzene in gasoline be reduced through federal regulation to 1 per cent by volume and that aromatics (or equivalent benzene tailpipe emissions) remain at 1994 levels. The most significant decline was in xylenes where the annual composite mean decreased by approximately 57 per cent over the last decade. This decline may be partially attributed to Ontario's Gasoline Volatility regulation (O. Reg. 271/91), passed in 1991, that limits gasoline vapour pressure during the summer.

**Figure 6.1**  
**Locations of Ambient VOC Monitoring Sites Across Ontario**  
**(2003)**



Note: Data from these sites are provided by Environment Canada as part of the NAPS program.



### ***1,1,1-trichloroethane, carbon tetrachloride and tetrachloroethylene***

A halogenated VOC compound is one onto which a halogen (e.g. chlorine, bromine, fluorine or iodine) has been attached to the VOC. Typical halogenated VOCs include 1,1,1-trichloroethane, carbon tetrachloride and tetrachloroethylene. 1,1,1-trichloroethane is a colourless liquid with a sweet odour that evaporates quickly into a vapour. It is found in many common products such as glue, paint, industrial degreasers and aerosol sprays. Carbon tetrachloride is also a clear liquid but it is most often found as a colourless gas. It has a strong aromatic odour that can be detected at low levels. Carbon tetrachloride is produced for use in the manufacturing of refrigerants and propellants for aerosols. Tetrachloroethylene is a colourless, non-flammable liquid with a sweet odour. Tetrachloroethylene (also known as perchloroethylene or PERC) is widely used in dry cleaning and textile operations, and metal degreasing. It is also used in the production of other chemicals, in rubber coatings, solvent soaps, printing inks, adhesives and glues, sealants, polishes, lubricants, and pesticides.

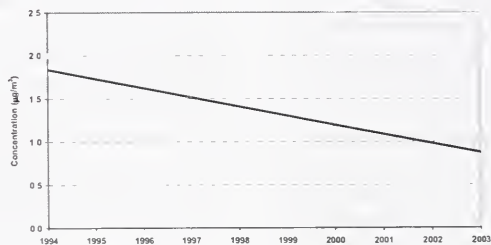
Figure 6.3 shows trends in 1,1,1-trichloroethane, carbon tetrachloride and tetrachloroethylene for the period 1994 to 2003. 1,1,1-trichloroethane and carbon tetrachloride show a decreasing trend over the 10-year period. Tetrachloroethylene concentrations increased from 1994 to 1999 and then decreased to 2003. This decrease in the annual mean concentrations for PERC could be attributed to the increase in efficiency in dry cleaning operations including technologically advanced machines with high efficiency solvent recovery, plus a trend towards alternatives such as water-based cleaning.

The most significant decline of the halogenated compounds studied was in 1,1,1-trichloroethane where the annual composite mean decreased by approximately 88 per cent over the last decade. 1,1,1-trichloroethane, also known as methyl

chloroform (MCF), was added to the list of ozone-depleting substances (ODS) under the Montreal Protocol on Substances that Deplete the Ozone Layer in 1992 to protect the Earth's upper atmosphere. This protocol agrees to phase out the production and consumption of ozone depleting substances on a very specific reduction schedule leading to a complete phase-out of a substance. (Under the Montreal Protocol, consumption refers to the supply [production + import – export] of ODS, and not to the use of ODS'). The protocol proposes MCF be completely phased out by 2005, hence the significant decline in annual concentrations over the last decade.

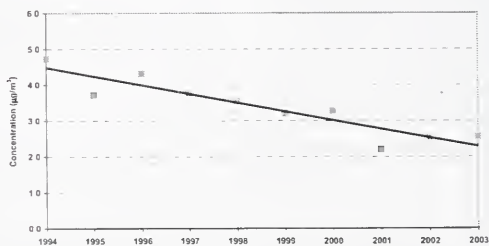


**Figure 6.2**  
**Trends of Benzene, Toluene and Xylenes Concentrations in Ontario**  
**(1994 - 2003)**



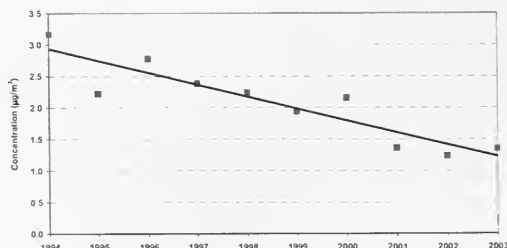
Note: Annual composite mean based on eight sites over ten years; data from these sites are provided by Environment Canada as part of the NAPS program.

a) Benzene



Note: Annual composite mean based on eight sites over ten years; data from these sites are provided by Environment Canada as part of the NAPS program.

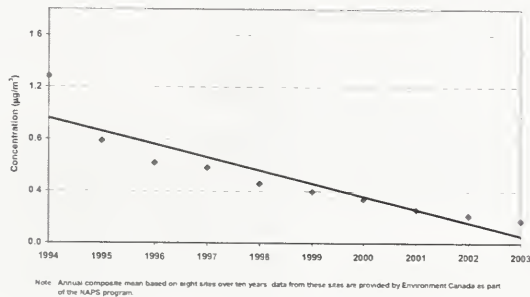
b) Toluene



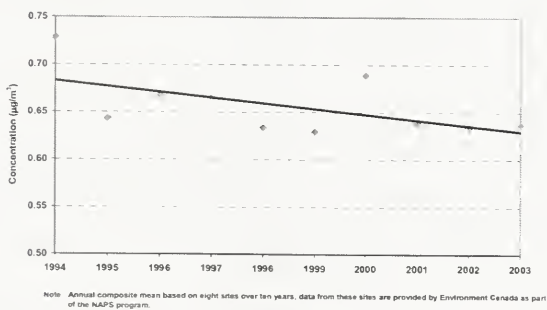
Note: Annual composite mean based on eight sites over ten years; data from these sites are provided by Environment Canada as part of the NAPS program.

c) Xylene

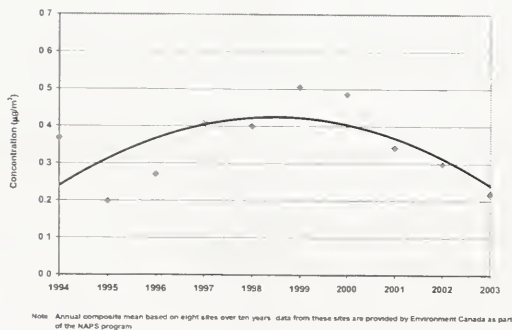
**Figure 6.3**  
**Trends of 1,1,1-Trichloroethane, Carbon Tetrachloride and Tetrachloroethylene Concentrations in Ontario (1994 - 2003)**



a) 1,1,1-Trichloroethane



b) Carbon Tetrachloride



c) Tetrachloroethylene

## GLOSSARY

|                             |   |
|-----------------------------|---|
| <b>Acidic deposition</b>    | <ul style="list-style-type: none"><li>- refers to deposition of a variety of acidic pollutants (acids or acid-forming substances such as sulphates and nitrates) on biota or land or in waters of the Earth's surface.</li></ul>  |
| <b>Air Quality Index</b>    | <ul style="list-style-type: none"><li>- real-time information system that provides the public with an indication of air quality in cities, towns and in rural areas across Ontario.</li></ul>   |
| <b>AQI station</b>          | <ul style="list-style-type: none"><li>- continuous monitoring station used to inform the public of general ambient air quality levels over an entire region (not a localized area) on a real-time basis; station reports on criteria pollutant levels that are not unduly influenced by a single emission source, but rather are the result of emissions from multiple sources, including those in neighbouring provinces and states.</li></ul> |
| <b>Airshed</b>              | <ul style="list-style-type: none"><li>- a geographical region of influence or spatial extent of the air pollution burden.</li></ul>   |
| <b>Ambient air</b>          | <ul style="list-style-type: none"><li>- outdoor or open air.</li></ul>  |
| <b>Aromatic hydrocarbon</b> | <ul style="list-style-type: none"><li>- a compound where the double-bond carbon atoms occur in a ring-type pattern.</li></ul>   |
| <b>Carbon monoxide</b>      | <ul style="list-style-type: none"><li>- a colourless, odourless, tasteless and at high concentrations, a poisonous gas.</li></ul>   |
| <b>Carcinogen</b>           | <ul style="list-style-type: none"><li>- an agent that incites carcinoma (cancer) or other malignancy.</li></ul>   |
| <b>Continuous pollutant</b> | <ul style="list-style-type: none"><li>- contaminant for which a continuous record exists; effectively, pollutants that have hourly data (maximum 8,760 values per year except leap year – i.e. 2000 where maximum values for the year are 8,784).</li></ul>   |
| <b>Continuous station</b>   | <ul style="list-style-type: none"><li>- where pollutants are measured on a real-time basis and data determined hourly (for example ozone, sulphur dioxide).</li></ul>   |
| <b>Criterion</b>            | <ul style="list-style-type: none"><li>- maximum concentration or level (based on potential effects) of contaminant that is desirable or considered acceptable in ambient air.</li></ul>   |
| <b>Detection limit</b>      | <ul style="list-style-type: none"><li>- minimum concentration of a contaminant that can be determined.</li></ul>  |

*Glossary continued...*

|                                |   |
|--------------------------------|---|
| <b>Exceedance</b>              | <ul style="list-style-type: none"><li>- violation of the air pollutant concentration levels established by environmental protection criteria or other environmental standards.</li></ul>  |
| <b>Fine Particulate Matter</b> | <ul style="list-style-type: none"><li>- particles smaller than about 2.5 microns in aerodynamic diameter, which arise mainly from condensation of hot vapours and chemically-driven gas-to-particle conversion processes; also referred to as PM<sub>2.5</sub>. These are fine enough to penetrate deep into the lungs and have the greatest effects on health.</li></ul> |
| <b>Fossil fuels</b>            | <ul style="list-style-type: none"><li>- natural gas, petroleum, coal and any form of solid, liquid or gaseous fuel derived from such materials for the purpose of generating heat.</li></ul>  |
| <b>Global warming</b>          | <ul style="list-style-type: none"><li>- long-term rise in the average temperature of the earth's atmosphere; principally due to an increase in the build-up of carbon dioxide and other gases.</li></ul>  |
| <b>Ground-level ozone</b>      | <ul style="list-style-type: none"><li>- colourless gas formed from chemical reactions between nitrogen oxides and hydrocarbons in the presence of sunlight near the Earth's surface.</li></ul>  |
| <b>Inhalable particles</b>     | <ul style="list-style-type: none"><li>- represent up to 60 per cent of the total suspended particulate matter; composed of both coarse (diameter 2.6 to 10.0 microns) and fine (diameter &lt; 2.5 microns) particles; also referred to as PM<sub>10</sub>.</li></ul>  |
| <b>Micron</b>                  | <ul style="list-style-type: none"><li>- a millionth of a metre.</li></ul>   |
| <b>Nitrogen dioxide</b>        | <ul style="list-style-type: none"><li>- a reddish-brown gas with a pungent and irritating odour.</li></ul>  |
| <b>Ozone episode day</b>       | <ul style="list-style-type: none"><li>- a day on which widespread (hundreds of kilometres) elevated ozone levels (greater than 80 ppb maximum hourly concentration) occur simultaneously.</li></ul>   |
| <b>Particulate matter</b>      | <ul style="list-style-type: none"><li>- refers to all airborne finely divided solid or liquid material with an aerodynamic diameter smaller than 44 microns.</li></ul>  |
| <b>Percentile value</b>        | <ul style="list-style-type: none"><li>- percentage of the data set that lies below the stated value; if the 70 percentile value is 0.10 ppm, then 70 per cent of the data are equal to or below 0.10 ppm.</li></ul>   |

*Glossary continued...*

|                               |  |
|-------------------------------|--|
| <b>Photochemical oxidant</b>  | - a complex mixture of chemicals produced in the atmosphere; these air pollutants are formed by the action of sunlight on oxides of nitrogen and VOCs.   |
| <b>Photochemical smog</b>     | - see <i>smog</i> .  |
| <b>Photochemical reaction</b> | - Chemical reaction influenced or initiated by light, particularly ultraviolet light.  |
| <b>Primary pollutant</b>      | - contaminant emitted directly to the atmosphere.  |
| <b>Secondary pollutant</b>    | - Contaminant formed from other pollutants in the atmosphere.  |
| <b>Smog</b>                   | - a contraction of smoke and fog; colloquial term used for photochemical smog, which includes ozone and other contaminants; tends to be a brownish haze.   |
| <b>Smog advisory</b>          | - smog advisories are issued to the public when there is a strong likelihood that widespread, elevated and persistent smog levels are expected.  |
| <b>Stratosphere</b>           | - atmosphere 10 to 40 kilometres above the Earth's surface.  |
| <b>Stratospheric ozone</b>    | - ozone formed in the stratosphere from the conversion of oxygen molecules by solar radiation; ozone found there absorbs much ultraviolet radiation and prevents it from reaching the Earth.       |
| <b>Sulphur dioxide</b>        | - a colourless gas that smells like burnt matches.   |
| <b>Toxic deposition</b>       | - deposition of an airborne toxic pollutant at ground, vegetative or surface levels.   |
| <b>Toxic pollutant</b>        | - substance that can cause cancer, genetic mutations, organ damage, changes to the nervous system, or even physiological harm as a result of prolonged exposure, even to relatively small amounts. |
| <b>Troposphere</b>            | - atmospheric layer extending about 10 kilometres above the Earth's surface.   |

## ABBREVIATIONS

|                   |   |
|-------------------|---|
| AAQC              | - Ambient Air Quality Criteria (Ontario)                |
| AQI               | - Air Quality Index                                     |
| ASAP              | - Anti-Smog Action Plan                                 |
| BTX               | - benzene, toluene, xylenes                             |
| CCME              | - Canadian Council of Ministers of the Environment      |
| CO                | - carbon monoxide                                       |
| CWS               | - Canada-wide Standard                                  |
| DL                | - detection limit                                       |
| EC                | - Environment Canada                                    |
| EMRB              | - Environmental Monitoring and Reporting Branch         |
| GTA               | - Greater Toronto Area                                  |
| IVR               | - Integrated Voice Response                             |
| MCF               | - methyl chloroform                                     |
| MOE               | - Ministry of the Environment                           |
| NAAQS             | - National Ambient Air Quality Standard (U.S.)          |
| NAPS              | - National Air Pollution Surveillance (Canada)          |
| NIST              | - National Institute of Standards and Technology (U.S.) |
| NO                | - nitric oxide  |
| NO <sub>2</sub>   | - nitrogen dioxide                                      |
| NO <sub>x</sub>   | - nitrogen oxides                                       |
| O <sub>3</sub>    | - ozone   |
| ODS               | - ozone depleting substances                            |
| PERC              | - perchloroethylene                                     |
| PM <sub>2.5</sub> | - fine particulate matter                               |
| SES (TEOM)        | - Sample Equilibration System                           |
| SO <sub>2</sub>   | - sulphur dioxide                                       |

*Abbreviations continued..*

|  |  |
|--|--|
| <b>TEOM</b>                                | - Tapered Element Oscillating Microbalance                         |
| <b>TRS</b>                                 | - total reduced sulphur  |
| <b>VOCs</b>                                | - volatile organic compounds                                       |
| <b><math>\mu\text{g}/\text{m}^3</math></b> | - micrograms (of contaminant) per cubic metre (of air) – by weight |
| <b>ppb</b>                                 | - parts (of contaminant) per billion (parts of air) – by volume    |
| <b>ppm</b>                                 | - parts (of contaminant) per million (parts of air) – by volume    |



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**AIR QUALITY IN ONTARIO  
2003 REPORT  
APPENDIX**

## **ACKNOWLEDGEMENTS**

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## **INTRODUCTION**

This appendix is intended for use in conjunction with the 2003 Annual Air Quality in Ontario report. The first section of the Appendix briefly describes the provincial air monitoring network, quality assurance and quality control procedures and the Ministry of the Environment's air quality database. The second part of the Appendix includes a series of tables displaying station locations and a listing of the summary statistics including means, maxima, percentile values and the number of exceedances of the Ontario ambient air quality criteria (AAQC) for each pollutant.

## **MONITORING NETWORK OPERATIONS**

### ***Network Description***

In 2003, the network comprised of 163 continuous monitoring instruments at 41 ambient sites, which included 37 real-time PM<sub>2.5</sub> monitors. During 2003, the Environmental Monitoring and Reporting Branch operated all of the ambient sites. Monitoring site locations for the continuous network are illustrated in Map 1.

### ***Quality Assurance and Quality Control***

Day-to-day air monitoring and maintenance of the instruments is administered by staff of the Environmental Monitoring and Reporting Branch. Instrumentation precision is verified by automatic daily zero and span checks to a known concentration of gas. Data analysts and station operators review span control charts to confirm instrument precision using a telemetry system.

The air monitoring station operators routinely inspect and maintain monitoring equipment and stations with mandatory monthly on-site visits where secondary transfer standards are used to calibrate instrumentation.

The Environmental Monitoring and Reporting Branch operate a laboratory with gas reference standards that adhere to those of the U.S. National Institute of Standards and Technology (NIST) and the Pollution Measurement Division of Environment Canada. The secondary transfer standards used by station operators are referenced and certified to EMRB's NIST primary standards on a quarterly basis. Primary weighed filter standards from Rupprecht and Patashnik are used to calibrate the TEOM spring constant twice a year.

The Ontario ambient air quality monitoring network undergoes constant maintenance to ensure a high standard of quality control. Continuous real-time data are consistently reviewed, assessed, and validated by regional staff and staff of the Environmental Monitoring and Reporting Branch. Immediate actions are taken to correct any inconsistencies that may affect the validity of the data. These measures ensure ambient air monitoring data are valid, complete, comparable, representative and accurate.

### ***Data Base***

The ambient air quality data used in this report are stored in the ministry's air quality information system (AQIS). A statistical pattern test is used to identify data anomalies, such as unusual pollutant

concentrations. Each pollutant has a predetermined concentration range based on historical data. Values outside this range are flagged for further investigation.

Data, obtained from automated ambient air monitoring instruments that operate continuously, produce an average measurement for every hour for a possible total of 8760 measurements in a given year. Hourly parameters measured include O<sub>3</sub>, PM<sub>2.5</sub>, NO/NO<sub>2</sub>/ NO<sub>x</sub>, CO, SO<sub>2</sub> and TRS compounds. A valid annual mean requires at least 6570 hourly readings. In addition, each quarter of the year should have 75 per cent valid data.

To be included in the 10-year trend analysis, a site must have valid annual means for a minimum of 8 years in the 10-year period from 1994-2003.

## **NETWORK DESCRIPTIVE TABLES AND ANNUAL STATISTICS**

The complete continuous (hourly) network is summarized in Table 1 and Map 1. The table displays the station name, numerical identifier, and pollutants measured. The numerical identifier is the station (ID) number, the first digit of which identifies the geographic region in which the station is located.

The 2003 statistical data and 10-year trends for various continuous pollutants are provided in Tables 2-16. The stations used in the 10-year trends are listed in Table 17. The 2003 statistical data for selected VOCs (see Table 18 for list) are presented in Tables 19-26.

Table 1: Ontario Continuous Ambient Air Monitoring Network (2003)

| CITY/TOWN         | STATION LOCATION                        | ID    | YR | LAT   | LONG  | ELEV | SO <sub>2</sub> | CO | O <sub>3</sub> | NO/NO <sub>2</sub><br>NO <sub>x</sub> | PM <sub>2.5</sub> | TRS | AQI |
|-------------------|---|-------|----|-------|-------|------|-----------------|----|----------------|---------------------------------------|-------------------|-----|-----|
| WINDSOR DOWNTOWN  | 467 UNIVERSITY AVE. W.                  | 12008 | 69 | 42:19 | 83:03 | 8    | T               | T  | T              | T                                     | T                 |     | T   |
| WINDSOR WEST      | COLLEGE/SOUTH ST.                       | 12016 | 75 | 42:18 | 83:04 | 4    | T               |    | T              | T                                     | T                 | T   | T   |
| MERLIN            | MIDDLE RD., MOE WATER PUMP STN.         | 13021 | 77 | 42:15 | 82:13 | 4    |                 |    | T              |                                       | T                 |     | *   |
| SARNIA            | FRONT ST./CN TRACKS, CENTENNIAL PARK    | 14064 | 76 | 42:59 | 82:24 | 3    | T               |    | T              | T                                     | T                 | T   | T   |
| GRAND BEND        | HWY 21/COUNTY RD. 83, VISITOR INFO CTR. | 15020 | 91 | 43:20 | 81:44 | 3    |                 |    | T              |                                       | T                 |     | *   |
| LONDON            | 900 HIGHBURY AVE.                       | 15025 | 95 | 42:61 | 81:13 | 4    | T               | T  | T              | T                                     | T                 |     | T   |
| PORT STANLEY      | ELGIN WATER TREATMENT PLANT             | 16015 | 02 | 42:41 | 81:11 | 5    |                 |    | T              |                                       | T                 |     | *   |
| TIVERTON          | LOT C/CONCESSION 5, VISITOR INFO CTR.   | 18007 | 79 | 44:18 | 81:35 | 5    |                 |    | T              |                                       | T                 |     | *   |
| SIMCOE            | HWY 3/BLEUE LINE RD                     | 22071 | 75 | 42:51 | 80:16 | 4    |                 |    | T              | T                                     | T                 |     | T   |
| KITCHENER         | WEST AVE./HOMewood                      | 26060 | 90 | 43:26 | 80:30 | 5    | T               | T  | T              | T                                     | T                 |     | T   |
| ST. CATHARINES    | ARGYLE CRES., PUMP STATION              | 27067 | 87 | 43:10 | 79:14 | 4    | T               |    | T              |                                       | T                 |     | T   |
| GUELPH            | 70 DIVISION STREET, EXHIBITION PARK     | 28028 | 00 | 43:33 | 80:16 | 4    |                 |    | T              | T                                     | T                 |     | T   |
| HAMILTON DOWNTOWN | ELGIN/KELLY                             | 29000 | 87 | 43:15 | 79:52 | 4    | T               | T  | T              | T                                     | T                 |     | T   |
| HAMILTON MOUNTAIN | VICKERS RD/EAST 18TH ST.                | 29114 | 85 | 43:14 | 79:52 | 3    | T               |    | T              | T                                     | T                 |     | T   |
| HAMILTON WEST     | MAIN ST. W./HWY 403                     | 29118 | 85 | 43:15 | 79:54 | 3    | T               | T  | T              | T                                     | T                 |     | T   |
| TORONTO DOWNTOWN  | BAY/WELLESLEY                           | 31103 | 00 | 43:39 | 79:23 | 10   | T               | T  | T              | T                                     | T                 |     | T   |
| TORONTO           | CN TOWER                                | 31190 | 89 | 43:35 | 79:23 | 444  |                 |    | T              | T                                     |                   |     |     |
| TORONTO EAST      | KENNEDY/LAWRENCE                        | 33003 | 70 | 43:45 | 79:16 | 5    |                 |    | T              | T                                     | T                 |     | T   |
| TORONTO NORTH     | YONGE ST/FINCH AVE.                     | 34020 | 88 | 43:47 | 79:25 | 5    |                 |    | T              | T                                     | T                 |     | T   |
| ETOBICOKE SOUTH   | 185 JUDSON ST.                          | 35033 | 67 | 43:36 | 79:30 | 5    | T               | T  | T              | T                                     | T                 |     | T   |
| TORONTO WEST      | 125 RESOURCES RD.                       | 35125 | 00 | 43:42 | 79:32 | 8    | T               | T  | T              | T                                     | T                 |     | T   |
| BURLINGTON        | HWY 2/NORTH SHORE BLVD E.               | 44008 | 79 | 43:19 | 79:48 | 5    | T               | T  | T              | T                                     | T                 |     | T   |
| OAKVILLE          | BRONTE RD/WOBURN CRES.                  | 44015 | 80 | 43:24 | 79:44 | 5    | T               | T  | T              | T                                     |                   | T   |     |
| OAKVILLE          | 8TH LINE/GLENASHTON DR., HALTON RSV.    | 44017 | 03 | 43:29 | 79:42 | 12   | T               | T  | T              | T                                     | T                 |     | T   |
| OSHAWA            | RITSON RD./OLIVE AVE., RITSON RD. P.S.  | 45025 | 79 | 43:53 | 78:51 | 5    |                 |    | T              | T                                     | T                 |     | T   |
| BRAMPTON          | 525 MAIN ST. N., PEEL MANOR             | 46089 | 00 | 43:42 | 79:47 | 5    | T               | T  | T              | T                                     | T                 |     | T   |
| MISSISSAUGA       | QUEENSWAY W./HURONTARIO ST.             | 46110 | 77 | 43:34 | 79:37 | 5    | T               | T  | T              | T                                     | T                 |     | T   |
| BARRIE            | 83 PERRY ST.                            | 47045 | 01 | 44:22 | 79:42 | 5    | T               | T  | T              | T                                     | T                 |     | T   |
| STOUFVILLE        | HWY 47/E. OF HWY 48                     | 48002 | 74 | 43:58 | 79:16 | 5    |                 |    | T              |                                       |                   |     |     |
| NEWMARKET         | EAGLE ST./MCCAFFREY RD                  | 48006 | 01 | 44:02 | 79:28 | 5    | T               | T  | T              | T                                     | T                 |     | T   |

**Table 1: Ontario Continuous Ambient Air Monitoring Network (2003)**

| CITY/TOWN        | STATION LOCATION                     | ID    | YR        | LAT       | LONG      | ELEV      | SO <sub>2</sub> | CO | O <sub>3</sub> | NO/NO <sub>2</sub><br>NO <sub>x</sub> | PM <sub>2.5</sub> | TRS      | AQI       |
|------------------|--------------------------------------|-------|-----------|-----------|-----------|-----------|-----------------|----|----------------|---------------------------------------|-------------------|----------|-----------|
| PARRY SOUND      | 7 BAY ST.                            | 49005 | 01        | 45:20     | 80:02     | 5         | .               | .  | T              | .                                     | T                 | .        | *         |
| DORSET           | HWY 117/PAINT LAKE RD.               | 49010 | 81        | 45:13     | 78:56     | 3         | .               | .  | T              | .                                     | T                 | .        | *         |
| OTTAWA           | RIDEAU/WURTENBURG ST.                | 51001 | 71        | 45:26     | 75:41     | 4         | T               | T  | T              | T                                     | T                 | .        | T         |
| KINGSTON         | 133 DALTON AVE.                      | 52020 | 88        | 44:14     | 76:31     | 5         | .               | .  | T              | .                                     | T                 | .        | T         |
| BELLEVILLE       | 2 SIDNEY ST., WATER TREATMENT PLANT  | 54012 | 02        | 44:09     | 77:23     | 10        | T               | T  | T              | T                                     | T                 | .        | T         |
| CORNWALL         | BEDFORD/THIRD ST., MEMORIAL PARK     | 56051 | 70        | 45:01     | 74:44     | 4         | .               | .  | T              | .                                     | T                 | .        | T         |
| PETERBOROUGH     | 10 HOSPITAL DR.                      | 59006 | 98        | 44:18     | 78:21     | 5         | T               | T  | T              | T                                     | T                 | .        | T         |
| THUNDER BAY      | JAMES/WALSH ST.                      | 63200 | 86        | 48:23     | 89:17     | 3         | T               | T  | T              | T                                     | T                 | T        | T         |
| SAULT STE. MARIE | PATRICK ST., WM. MERRIFIELD SCHOOL   | 71068 | 87        | 46:32     | 84:21     | 3         | T               | .  | T              | T                                     | T                 | T        | T         |
| NORTH BAY        | CHIPPEWA ST., DEPT. NATIONAL DEFENSE | 75010 | 79        | 46:19     | 79:27     | 4         | .               | .  | T              | T                                     | T                 | .        | T         |
| SUDBURY          | 100 RAMSEY LAKE RD./SCIENCE NORTH    | 77203 | 84        | 46:28     | 80:59     | 15        | T               | T  | T              | T                                     | .                 | T        | T         |
| <b>Totals:</b>   |                                      |       | <b>25</b> | <b>20</b> | <b>41</b> | <b>31</b> |                 |    |                |                                       | <b>37</b>         | <b>9</b> | <b>37</b> |

**LEGEND:**

- ID - Station identification number
- YR. - Year station monitoring began
- LAT. - Latitude (degrees:minutes)
- LONG. - Longitude (degrees:minutes)
- ELEV. - Air intake height above ground (m)

- SO<sub>2</sub> - Sulphur Dioxide
- CO - Carbon Monoxide
- O<sub>3</sub> - Ozone
- NO - Nitric Oxide
- NO<sub>2</sub> - Nitrogen Dioxide
- NO<sub>x</sub> - Oxides of Nitrogen
- PM<sub>2.5</sub> - Fine Particulate Matter
- TRS - Total Reduced Sulphur
- AQI - Air Quality Index
- T - Telemetry
- \*
- Seasonal AQI site (May 1 - September 30 only)

**Table 2: Ozone (O<sub>3</sub>) Statistics (2003)**

Unit: parts per billion (ppb)

O<sub>3</sub> 1-hour AAQC is 80 ppb

| ID    | City              | Location                                | Valid h | 10% | P  | E  | R  | C  | E  | N    | T    | I   | L   | E  | S | Mean | Maximum<br>1h | 24h | # of Times<br>Above Criterion |
|-------|-------------------|---|---------|-----|----|----|----|----|----|------|------|-----|-----|----|---|------|---------------|-----|-------------------------------|
| 12008 | Windsor Downtown  | 467 University Ave.                     | 8524    | 3   | 11 | 20 | 30 | 46 | 76 | 76   | 22.9 | 111 | 61  | 60 |   |      |               |     |                               |
| 12016 | Windsor West      | College/South St.                       | 8618    | 4   | 11 | 19 | 29 | 47 | 81 | 22.8 | 123  | 73  | 90  |    |   |      |               |     |                               |
| 13021 | Merlin            | Middle Rd., Moe Water Pump Stn.         | 8629    | 10  | 20 | 27 | 35 | 50 | 80 | 29.0 | 120  | 85  | 86  |    |   |      |               |     |                               |
| 14064 | Samia             | Front St. Cn Tracks, Centennial Park    | 8419    | 6   | 17 | 24 | 31 | 42 | 68 | 24.7 | 110  | 63  | 32  |    |   |      |               |     |                               |
| 15020 | Grand Bend        | Water Treatment Plant                   | 8518    | 14  | 23 | 30 | 37 | 46 | 69 | 30.7 | 131  | 75  | 39  |    |   |      |               |     |                               |
| 15025 | London            | 900 Highbury Ave.                       | 8349    | 6   | 17 | 25 | 34 | 49 | 75 | 26.9 | 109  | 81  | 40  |    |   |      |               |     |                               |
| 16015 | Port Stanley      | 43665 Dexter Line, Elgin Water T. Plt   | 8538    | 16  | 26 | 33 | 41 | 56 | 88 | 34.9 | 129  | 94  | 138 |    |   |      |               |     |                               |
| 18007 | Tiverton          | Concession Rd. 2, Lot A                 | 8451    | 17  | 26 | 32 | 39 | 51 | 78 | 33.2 | 135  | 88  | 68  |    |   |      |               |     |                               |
| 22071 | Sincoe            | Hwy 3/Blue Line Rd., Experimental Farm  | 8463    | 16  | 25 | 32 | 39 | 55 | 85 | 33.9 | 115  | 93  | 118 |    |   |      |               |     |                               |
| 26060 | Kitchener         | West Ave./Homeswood                     | 8674    | 5   | 19 | 27 | 36 | 49 | 77 | 28.1 | 109  | 83  | 66  |    |   |      |               |     |                               |
| 27067 | St. Catharines    | Argyle Cres., Pump Stn.                 | 8568    | 4   | 16 | 24 | 32 | 47 | 75 | 25.3 | 107  | 81  | 59  |    |   |      |               |     |                               |
| 28028 | Guelph            | Exhibition St./Clark St.                | 8474    | 5   | 16 | 24 | 31 | 42 | 71 | 24.4 | 102  | 74  | 38  |    |   |      |               |     |                               |
| 29000 | Hamilton Downtown | Elgin Kelly                             | 8675    | 2   | 12 | 20 | 28 | 42 | 72 | 21.7 | 101  | 80  | 39  |    |   |      |               |     |                               |
| 29114 | Hamilton Mountain | Vickers Rd./E. 18th St.                 | 8579    | 8   | 19 | 27 | 35 | 49 | 80 | 28.4 | 114  | 89  | 79  |    |   |      |               |     |                               |
| 29118 | Hamilton West     | Main St. W./ Hwy 403                    | 8688    | 4   | 11 | 21 | 29 | 41 | 70 | 22.0 | 110  | 79  | 40  |    |   |      |               |     |                               |
| 31103 | Toronto Downtown  | Bay/Wellesley St.                       | 8679    | 4   | 13 | 21 | 30 | 44 | 75 | 23.6 | 115  | 70  | 65  |    |   |      |               |     |                               |
| 31190 | Toronto           | CN Tower, 301 Front St. W.              | 8565    | 18  | 28 | 35 | 42 | 59 | 89 | 36.9 | 129  | 101 | 153 |    |   |      |               |     |                               |
| 33003 | Toronto East      | Kennedy/Lawrence                        | 8642    | 3   | 11 | 20 | 29 | 42 | 70 | 21.8 | 112  | 66  | 40  |    |   |      |               |     |                               |
| 34020 | Toronto North     | Hendon/Yonge St.                        | 8610    | 4   | 13 | 23 | 31 | 43 | 69 | 23.6 | 112  | 73  | 42  |    |   |      |               |     |                               |
| 35033 | Ettobicoke South  | 185 Judson St.                          | 8296    | 3   | 9  | 17 | 25 | 39 | 61 | 19.2 | 93   | 45  | 10  |    |   |      |               |     |                               |
| 35125 | Toronto West      | 125 Resources Rd.                       | 8541    | 3   | 7  | 15 | 24 | 40 | 67 | 18.7 | 104  | 55  | 40  |    |   |      |               |     |                               |
| 44008 | Burlington        | Hwy 7/North Shore Blvd. E.              | 8648    | 2   | 12 | 21 | 31 | 45 | 71 | 22.8 | 104  | 65  | 33  |    |   |      |               |     |                               |
| 44015 | Oakville          | Bronte Rd./Woburn Cres.                 | 3557*   | 5   | 18 | 27 | 35 | 46 | 63 | INS  | 76   | 55  | 0   |    |   |      |               |     |                               |
| 44017 | Oakville          | 8th Line/Glenashdon Dr., Halton Reserv. | 5068*   | 8   | 18 | 26 | 36 | 53 | 86 | INS  | 114  | 85  | 79  |    |   |      |               |     |                               |
| 45025 | Oshawa            | Ritson Rd./Public School                | 8697    | 4   | 15 | 24 | 32 | 41 | 65 | 24.1 | 107  | 59  | 37  |    |   |      |               |     |                               |
| 46089 | Brampton          | 525 Main St. N., Peel Manor             | 8698    | 3   | 15 | 25 | 33 | 44 | 77 | 25.1 | 111  | 79  | 68  |    |   |      |               |     |                               |
| 46110 | Mississauga       | Mississauga General Hospital            | 8526    | 6   | 14 | 23 | 32 | 45 | 76 | 24.8 | 110  | 76  | 61  |    |   |      |               |     |                               |
| 47045 | Barrie            | 83 Perry St.                            | 8589    | 2   | 14 | 23 | 31 | 42 | 67 | 23.2 | 94   | 63  | 21  |    |   |      |               |     |                               |
| 48002 | Stouffville       | Hwy 47/ E. Of Hwy 48                    | 8649    | 11  | 21 | 29 | 36 | 47 | 74 | 29.4 | 107  | 74  | 57  |    |   |      |               |     |                               |
| 48006 | Newmarket         | Eagle St./Mccaffrey Rd.                 | 8600    | 8   | 22 | 30 | 37 | 47 | 74 | 29.6 | 106  | 79  | 50  |    |   |      |               |     |                               |
| 49005 | Parry Sound       | 7 Bay St.                               | 6453*   | 11  | 22 | 29 | 37 | 51 | 77 | INS  | 103  | 83  | 54  |    |   |      |               |     |                               |
| 49010 | Dorset            | Hwy 117 / Paint Lake Rd.                | 8234    | 11  | 23 | 31 | 37 | 47 | 67 | 30.1 | 95   | 57  | 9   |    |   |      |               |     |                               |
| 51001 | Ottawa            | Rideau/Wurtemburg St.                   | 8102    | 5   | 16 | 24 | 31 | 44 | 64 | 24.7 | 104  | 65  | 15  |    |   |      |               |     |                               |
| 52020 | Kingston          | 133 Dalton St.                          | 8698    | 2   | 14 | 24 | 32 | 43 | 72 | 24.0 | 110  | 75  | 39  |    |   |      |               |     |                               |
| 54012 | Bellefleur        | 2 Sidney St., Water Treatment Plant     | 8673    | 10  | 21 | 30 | 38 | 51 | 82 | 30.9 | 149  | 94  | 103 |    |   |      |               |     |                               |
| 56051 | Cornwall          | Bedford/Third St.                       | 8601    | 5   | 18 | 26 | 32 | 44 | 72 | 25.9 | 109  | 89  | 38  |    |   |      |               |     |                               |
| 59006 | Peterborough      | 10 Hospital Dr.                         | 8632    | 10  | 22 | 29 | 36 | 47 | 75 | 29.7 | 120  | 87  | 60  |    |   |      |               |     |                               |
| 63200 | Thunder Bay       | 615 James St. S., Mto                   | 8124    | 5   | 18 | 27 | 35 | 43 | 58 | 26.1 | 78   | 61  | 0   |    |   |      |               |     |                               |
| 71068 | Sault Ste. Marie  | Wm. Merrifield School                   | 7607    | 7   | 18 | 27 | 35 | 45 | 62 | 26.8 | 89   | 62  | 2   |    |   |      |               |     |                               |
| 75010 | North Bay         | Chippewa St., Dept. National Defence    | 8462    | 7   | 19 | 27 | 34 | 45 | 68 | 27.0 | 89   | 72  | 22  |    |   |      |               |     |                               |
| 77203 | Sudbury           | Science North                           | 8627    | 13  | 22 | 28 | 34 | 44 | 68 | 28.5 | 95   | 78  | 23  |    |   |      |               |     |                               |

**Notes:**

\* Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.

\*\* CN Tower Site (Station 31190) - measurements taken at 444 m above ground level.

**Table 3: Fine Particulate Matter (PM<sub>2.5</sub>) Statistics (2003)**  
Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| ID    | City              | Location                                | Valid h | 10% | 30% | 50% | 70% | 90% | Mean | Maximum<br>1h 24 h | # of Times<br>Above Reference Level** |
|-------|-------------------|---|---------|-----|-----|-----|-----|-----|------|--------------------|---------------------------------------|
| 12008 | Windsor Downtown  | 467 University Ave.                     | 8480    | 0   | 3   | 6   | 10  | 19  | 42   | 8.5 64 43          | 5                                     |
| 12016 | Windsor West      | College/South St.                       | 8605    | 2   | 4   | 7   | 11  | 20  | 41   | 9.6 64 41          | 7                                     |
| 13021 | Merlin            | Middle Rd., Moe Water Pump Stn.         | 5053*   | 1   | 4   | 7   | 11  | 21  | 41   | INS 55 39          | 4                                     |
| 14064 | Sarnia            | Front St. Cn Tracks, Centennial Park    | 8350    | 3   | 6   | 9   | 14  | 24  | 49   | 11.9 101 59        | 13                                    |
| 15020 | Grand Bend        | Water Treatment Plant                   | 5847*   | 2   | 4   | 7   | 10  | 19  | 42   | INS 64 46          | 8                                     |
| 15025 | London            | 900 Highbury Ave.                       | 7730    | 3   | 6   | 9   | 12  | 21  | 43   | 10.9 61 43         | 9                                     |
| 16015 | Port Stanley      | 43665 Dexter Line, Elgin Water T. Plt   | 8332    | 1   | 3   | 6   | 9   | 17  | 39   | 8.0 62 39          | 5                                     |
| 18007 | Tiverton          | Concession Rd. 2, Lot A                 | 8289    | 1   | 2   | 4   | 7   | 15  | 36   | 6.5 69 44          | 4                                     |
| 22071 | Sincoe            | Hwy 3 Blue Line Rd., Experimental Farm  | 8323    | 1   | 3   | 6   | 9   | 17  | 36   | 7.8 56 37          | 4                                     |
| 26060 | Kitchener         | West Ave./Homewood                      | 7797    | 1   | 3   | 6   | 9   | 18  | 41   | 8.1 65 47          | 5                                     |
| 27067 | St. Catharines    | Argyle Cres., Pump Stn.                 | 8611    | 1   | 3   | 6   | 9   | 17  | 35   | 7.8 59 42          | 4                                     |
| 28028 | Guelph            | Exhibition St. Clark St.                | 7578    | 1   | 3   | 5   | 8   | 15  | 34   | 7.3 62 43          | 2                                     |
| 29000 | Hamilton Downtown | Elgin Kelly                             | 8662    | 2   | 5   | 8   | 12  | 23  | 44   | 10.6 66 46         | 12                                    |
| 29114 | Hamilton Mountain | Vickers Rd./E. 18th St.                 | 8461    | 2   | 4   | 7   | 11  | 21  | 44   | 9.6 72 49          | 6                                     |
| 29118 | Hamilton West     | Main St. W./ Hwy 403                    | 6512*   | 1   | 4   | 7   | 11  | 22  | 44   | INS 87 45          | 9                                     |
| 31103 | Toronto Downtown  | Bay/Wellesley St.                       | 8666    | 1   | 3   | 6   | 10  | 18  | 42   | 8.4 65 48          | 8                                     |
| 33003 | Toronto East      | Kennedy/Lawrence                        | 8611    | 2   | 4   | 6   | 10  | 19  | 42   | 8.8 69 49          | 7                                     |
| 34020 | Toronto North     | Hendon/Yonge St.                        | 8565    | 1   | 3   | 6   | 10  | 18  | 41   | 8.3 67 46          | 7                                     |
| 35033 | Eioboeke South    | 185 Judson St.                          | 7017*   | 2   | 5   | 8   | 12  | 22  | 47   | INS 75 52          | 12                                    |
| 35125 | Toronto West      | 125 Resources Rd.                       | 8539    | 3   | 5   | 7   | 11  | 20  | 41   | 9.8 78 51          | 8                                     |
| 44008 | Burlington        | Hwy 2/North Shore Blvd. E.              | 8665    | 1   | 4   | 6   | 10  | 18  | 40   | 8.6 62 48          | 6                                     |
| 44017 | Oakville          | 8th Line/Glenashion Dr., Halton Reserv. | 5063*   | 2   | 5   | 7   | 11  | 22  | 47   | INS 67 50          | 6                                     |
| 45025 | Oshawa            | Ritson Rd. Public School                | 8492    | 1   | 3   | 6   | 9   | 17  | 40   | 7.8 60 46          | 6                                     |
| 46089 | Brampton          | 525 Main St. N., Peel Manor             | 8675    | 1   | 3   | 6   | 10  | 18  | 39   | 8.2 64 42          | 7                                     |
| 46110 | Mississauga       | Mississauga General Hospital            | 8347    | 2   | 4   | 6   | 9   | 17  | 39   | 7.9 67 45          | 7                                     |
| 47045 | Barrie            | 83 Perry St.                            | 8476    | 1   | 3   | 5   | 9   | 17  | 36   | 7.5 61 39          | 4                                     |
| 48006 | Newmarket         | Eagle St./McCaffrey Rd.                 | 8590    | 1   | 3   | 5   | 8   | 16  | 38   | 7.3 59 41          | 4                                     |
| 49005 | Perry Sound       | 7 Bay St.                               | 6494*   | 0   | 2   | 4   | 7   | 13  | 35   | INS 56 40          | 3                                     |
| 49010 | Dorset            | Hwy 117 / Paint Lake Rd.                | 7117*   | 0   | 2   | 4   | 7   | 13  | 29   | INS 49 33          | 1                                     |
| 51001 | Ottawa            | Rideau/Wurtemburg St.                   | 8128    | 1   | 3   | 5   | 8   | 17  | 33   | 7.2 60 41          | 4                                     |
| 52020 | Kingston          | 133 Dalton St.                          | 6964*   | 1   | 4   | 6   | 10  | 19  | 43   | INS 99 55          | 5                                     |
| 54012 | Belleville        | 2 Sidney St., Water Treatment Plant     | 8658    | 1   | 3   | 5   | 8   | 15  | 34   | 6.9 57 42          | 3                                     |
| 56051 | Corwall           | Bedford/Third St.                       | 6070*   | 1   | 3   | 5   | 9   | 19  | 42   | INS 63 49          | 4                                     |
| 59006 | Peterborough      | 10 Hospital Dr.                         | 8608    | 1   | 3   | 5   | 8   | 15  | 35   | 6.7 60 42          | 3                                     |
| 63200 | Thunder Bay       | 615 James St. S., Mto                   | 8208    | 1   | 3   | 4   | 7   | 13  | 28   | 6.1 55 32          | 1                                     |
| 71068 | Sault Ste. Marie  | Wm. Merrifield School                   | 4076*   | 1   | 2   | 5   | 9   | 21  | 39   | INS 65 39          | 4                                     |
| 75010 | North Bay         | Chippewa St., Dept. National Defence    | 8458    | 1   | 2   | 4   | 6   | 12  | 26   | 5.5 51 31          | 1                                     |

Notes:

- Measurements taken by Tapered Element Oscillating Microbalance (TEOM) sampler.

\* Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.

\*\* The PM<sub>2.5</sub> reference level is 30 µg/m<sup>3</sup> for a 24-hour period (based on CWS).



**Table 4: Nitric Oxide (NO) Statistics (2003)**

Unit: parts per billion (ppb)

| ID    | City              | Location                                | Valid h | P E R C E N T I L E S |     |     |     |     | Mean | Maximum |
|-------|-------------------|---|---------|-----------------------|-----|-----|-----|-----|------|---------|
|       |                   |   |         | 10%                   | 30% | 50% | 70% | 90% | 1h   | 24h     |
| 12008 | Windsor Downtown  | 467 University Ave.                     | 3415*   | 2                     | 5   | 8   | 14  | 35  | INS  | 544     |
| 12016 | Windsor West      | College/South St.                       | 6218*   | 1                     | 3   | 7   | 14  | 34  | INS  | 572     |
| 14064 | Sarnia            | Front St./Ch Tracks, Centennial Park    | 8347    | 1                     | 2   | 2   | 4   | 11  | 41   | 5.0     |
| 15025 | London            | 900 Highbury Ave.                       | 3803*   | 1                     | 1   | 2   | 5   | 15  | 83   | INS     |
| 22071 | Simcoe            | Hwy 3/Blue Line Rd., Experimental Farm  | 2863*   | 0                     | 0   | 0   | 1   | 4   | 13   | INS     |
| 26060 | Kitchener         | West Ave. Homeewood                     | 3483*   | 0                     | 0   | 1   | 3   | 11  | 98   | INS     |
| 28028 | Guelph            | Exhibition St./Clark St.                | 2309*   | 1                     | 2   | 2   | 4   | 15  | 94   | INS     |
| 29000 | Hamilton Downtown | Elgin Kelly                             | 8679    | 1                     | 2   | 4   | 9   | 27  | 119  | 11.7    |
| 29114 | Hamilton Mountain | Vickers Rd./E. 18th St.                 | 8221    | 1                     | 3   | 3   | 5   | 15  | 72   | 7.2     |
| 29118 | Hamilton West     | Main St. W./ Hwy 403                    | 7246*   | 1                     | 2   | 5   | 12  | 47  | 167  | INS     |
| 31103 | Toronto Downtown  | Bay/Wellesley St.                       | 8597    | 1                     | 2   | 3   | 7   | 21  | 82   | 8.7     |
| 31190 | Toronto           | CN Tower, 301 Front St. W.              | 8662    | 1                     | 1   | 1   | 2   | 5   | 23   | 2.5     |
| 33003 | Toronto East      | Kennedy/Lawrence                        | 8570    | 1                     | 3   | 7   | 15  | 40  | 152  | 17.0    |
| 34020 | Toronto North     | Hendon/Yonge St.                        | 8480    | 0                     | 2   | 4   | 11  | 33  | 106  | 12.4    |
| 35033 | Etobicoke South   | 185 Judson St.                          | 8082    | 2                     | 5   | 11  | 23  | 70  | 220  | 26.7    |
| 35125 | Toronto West      | 125 Resources Rd.                       | 7080*   | 2                     | 5   | 14  | 29  | 74  | 252  | INS     |
| 44008 | Burlington        | Hwy 2/North Shore Blvd. E.              | 7036    | 0                     | 2   | 5   | 12  | 41  | 159  | 15.3    |
| 44015 | Oakville          | Bronte Rd./Woburn Cres.                 | 3521*   | 2                     | 2   | 4   | 7   | 26  | 121  | INS     |
| 44017 | Oakville          | 8th Line/Glenashton Dr., Halton Reserv. | 5085*   | 0                     | 1   | 1   | 3   | 12  | 59   | INS     |
| 45025 | Oshawa            | Ritson Rd./Public School                | 8536    | 0                     | 1   | 3   | 8   | 24  | 89   | 9.3     |
| 46110 | Mississauga       | Mississauga General Hospital            | 2075*   | 1                     | 5   | 9   | 16  | 48  | 221  | INS     |
| 46089 | Brampton          | 525 Main St. N., Peel Manor             | 8334    | 0                     | 1   | 2   | 6   | 27  | 125  | 10.4    |
| 47045 | Barrie            | 83 Perry St.                            | 8472    | 0                     | 1   | 2   | 4   | 19  | 129  | 9.3     |
| 48006 | Newmarket         | Eagle St./McCaffrey Rd.                 | 8545    | 0                     | 0   | 1   | 2   | 9   | 63   | 4.0     |
| 51001 | Ottawa            | Rideau/Wurtemburg St.                   | 8021    | 0                     | 0   | 1   | 4   | 14  | 69   | 5.8     |
| 54012 | Belleville        | 2 Sidney St., Water Treatment Plant     | 8664    | 2                     | 2   | 3   | 4   | 11  | 65   | 6.1     |
| 59006 | Peterborough      | 10 Hospital Dr.                         | 8700    | 1                     | 1   | 1   | 2   | 6   | 36   | 3.4     |
| 63200 | Thunder Bay       | 615 James St. S., Mto                   | 7840    | 2                     | 3   | 4   | 6   | 17  | 91   | 9.0     |
| 71068 | Sault Ste. Marie  | Wm. Morrifield School                   | 7825    | 1                     | 1   | 2   | 4   | 14  | 65   | 6.1     |
| 75010 | North Bay         | Chippewa St., Dept. National Defence    | 8573    | 1                     | 2   | 2   | 4   | 14  | 71   | 6.4     |
| 77203 | Sudbury           | Science North                           | 7512    | 0                     | 0   | 1   | 2   | 5   | 37   | 2.6     |

**Notes:**

\* Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.

\*\*CN Tower Site (Station 31190) - measurements taken at 444 m above ground level.

**Table 5: Nitrogen Dioxide (NO<sub>2</sub>) Statistics (2003)**

Unit: parts per billion (ppb)

NO<sub>2</sub> 1-hour AAQC is 200 ppb

NO<sub>2</sub> 24-hour AAQC is 100 ppb

| ID    | City              | Location                                | Valid h | P E R C E N T I L E S |     |     |     |     | Maximum |      | # of Times Above Criteria |    |     |   |
|-------|-------------------|---|---------|-----------------------|-----|-----|-----|-----|---------|------|---------------------------|----|-----|---|
|       |                   |   |         | 10%                   | 30% | 50% | 70% | 90% | Mean    | 1h   | 24h                       | 1h | 24h |   |
| 12008 | Windsor Downtown  | 467 University Ave.                     | 3415*   | 11                    | 18  | 23  | 29  | 39  | 56      | INS  | 80                        | 50 | 0   | 0 |
| 12016 | Windsor West      | College/South St.                       | 6218*   | 10                    | 15  | 20  | 26  | 37  | 55      | INS  | 97                        | 49 | 0   | 0 |
| 14064 | Sarnia            | Front St./Cn Tracks, Centennial Park    | 8347    | 4                     | 7   | 11  | 16  | 25  | 42      | 13.0 | 70                        | 43 | 0   | 0 |
| 15025 | London            | 900 Highbury Ave.                       | 3803*   | 5                     | 9   | 12  | 17  | 27  | 43      | INS  | 84                        | 34 | 0   | 0 |
| 22071 | Simcoe            | Hwy 3/Blue Line Rd., Experimental Farm  | 2863*   | 3                     | 5   | 7   | 10  | 17  | 33      | INS  | 50                        | 29 | 0   | 0 |
| 26060 | Kitchener         | West Ave./Homewood                      | 3483*   | 2                     | 5   | 9   | 15  | 30  | 58      | INS  | 80                        | 49 | 0   | 0 |
| 28028 | Guelph            | Exhibition St./Clark St.                | 2309*   | 4                     | 8   | 13  | 19  | 34  | 52      | INS  | 65                        | 37 | 0   | 0 |
| 29000 | Hamilton Downtown | Elgin/Kelly                             | 8679    | 9                     | 14  | 19  | 26  | 37  | 56      | 21.3 | 78                        | 57 | 0   | 0 |
| 29114 | Hamilton Mountain | Vickers Rd./E. 18th St                  | 8221    | 4                     | 7   | 11  | 17  | 30  | 51      | 14.5 | 66                        | 51 | 0   | 0 |
| 29118 | Hamilton West     | Main St. W./ Hwy 403                    | 7246*   | 4                     | 9   | 15  | 22  | 36  | 59      | INS  | 84                        | 54 | 0   | 0 |
| 31103 | Toronto Downtown  | Bay/Wellesley St.                       | 8597    | 10                    | 15  | 21  | 28  | 40  | 63      | 23.2 | 87                        | 62 | 0   | 0 |
| 31190 | Toronto           | CN Tower, 301 Front St. W.              | 8662    | 3                     | 5   | 7   | 11  | 19  | 35      | 9.3  | 65                        | 36 | 0   | 0 |
| 33003 | Toronto East      | Kennedy/Lawrence                        | 8570    | 8                     | 13  | 19  | 26  | 38  | 61      | 21.3 | 97                        | 62 | 0   | 0 |
| 34020 | Toronto North     | Hendon/Yonge St.                        | 8480    | 6                     | 12  | 18  | 26  | 38  | 58      | 20.4 | 79                        | 57 | 0   | 0 |
| 35033 | Etobicoke South   | 185 Judson St.                          | 8082    | 11                    | 17  | 24  | 32  | 45  | 73      | 26.6 | 100                       | 63 | 0   | 0 |
| 35125 | Toronto West      | 125 Resources Rd.                       | 7080*   | 11                    | 18  | 24  | 32  | 43  | 67      | INS  | 119                       | 71 | 0   | 0 |
| 44008 | Burlington        | Hwy 2/North Shore Blvd. E.              | 7036    | 4                     | 10  | 16  | 22  | 32  | 50      | 17.2 | 68                        | 44 | 0   | 0 |
| 44015 | Oakville          | Bronte Rd./Woburn Cres.                 | 3521*   | 4                     | 8   | 13  | 21  | 34  | 49      | INS  | 80                        | 41 | 0   | 0 |
| 44017 | Oakville          | 8th Line/Glenashion Dr., Halton Reserv. | 5085*   | 4                     | 7   | 11  | 16  | 26  | 39      | INS  | 72                        | 39 | 0   | 0 |
| 45025 | Oshawa            | Rtison Rd. Public School                | 8536    | 4                     | 9   | 14  | 20  | 31  | 48      | 16.2 | 82                        | 48 | 0   | 0 |
| 46089 | Brampton          | 525 Main St. N., Peel Manor             | 8334    | 4                     | 8   | 14  | 23  | 37  | 59      | 17.6 | 82                        | 58 | 0   | 0 |
| 46110 | Mississauga       | Mississauga General Hospital            | 2075*   | 10                    | 16  | 22  | 28  | 37  | 51      | INS  | 71                        | 43 | 0   | 0 |
| 47045 | Barrie            | 83 Perry St.                            | 8472    | 4                     | 7   | 11  | 17  | 31  | 58      | 14.8 | 110                       | 63 | 0   | 0 |
| 51001 | Ottawa            | Eagle St. McCaffrey Rd.                 | 8545    | 2                     | 4   | 7   | 12  | 24  | 48      | 10.2 | 61                        | 43 | 0   | 0 |
| 48006 | Newmarket         | Rideau/Wurtemburg St.                   | 8021    | 3                     | 6   | 10  | 16  | 30  | 53      | 13.7 | 83                        | 60 | 0   | 0 |
| 50012 | Belleville        | 2 Sidney St., Water Treatment Plant     | 8664    | 4                     | 5   | 8   | 12  | 22  | 43      | 10.5 | 60                        | 34 | 0   | 0 |
| 59006 | Peterborough      | 10 Hospital Dr                          | 8700    | 2                     | 3   | 6   | 9   | 18  | 37      | 8.3  | 49                        | 29 | 0   | 0 |
| 63200 | Thunder Bay       | 615 James St. S., Mto                   | 7840    | 3                     | 5   | 8   | 13  | 25  | 46      | 11.2 | 65                        | 36 | 0   | 0 |
| 71068 | Sault Ste. Marie  | Wm. Merrifield School                   | 7825    | 2                     | 4   | 7   | 13  | 24  | 41      | 10.6 | 58                        | 36 | 0   | 0 |
| 75010 | North Bay         | Chippewa St., Dept. National Defence    | 8573    | 2                     | 4   | 6   | 11  | 23  | 47      | 10.1 | 64                        | 36 | 0   | 0 |
| 77203 | Sudbury           | Science North                           | 7512    | 1                     | 3   | 5   | 9   | 18  | 41      | 7.8  | 54                        | 32 | 0   | 0 |

**Notes:**

\* Site does not meet requirement of 75% valid data per quarter. INS represents insufficient data for a valid mean.

\*\* CN Tower Site (Station 31190) - measurements taken at 444 m above ground level.

**Table 6: Nitrogen Oxides (NO<sub>x</sub>) Statistics (2003)**  
**Unit: parts per billion (ppb)**

| ID    | City              | Location                                | Valid h | 10% | 30% | 50% | 70% | 90% | 99% | Mean | Ib  | Maximum |
|-------|-------------------|---|---------|-----|-----|-----|-----|-----|-----|------|-----|---------|
| 12008 | Windsor Downtown  | 467 University Ave.                     | 3415*   | 15  | 24  | 32  | 43  | 72  | 192 | INS  | 613 | 164     |
| 12016 | Windsor West      | College/South St.                       | 6218*   | 13  | 21  | 29  | 40  | 69  | 219 | INS  | 655 | 221     |
| 14064 | Sarnia            | Front St./Cn Tracks, Centennial Park    | 8347    | 6   | 9   | 13  | 20  | 36  | 75  | 18.1 | 411 | 94      |
| 15025 | London            | 900 Highbury Ave.                       | 3803*   | 7   | 11  | 16  | 22  | 43  | 113 | INS  | 277 | 96      |
| 22071 | Simcoe            | Hwy. 3/Blue Line Rd., Experimental Farm | 2863*   | 3   | 5   | 8   | 11  | 20  | 41  | INS  | 93  | 38      |
| 26060 | Kitchener         | West Ave./Homeswood                     | 3483*   | 3   | 6   | 11  | 18  | 39  | 149 | INS  | 372 | 124     |
| 28028 | Guelph            | Exhibition St./Clark St                 | 2309*   | 5   | 9   | 15  | 23  | 48  | 133 | INS  | 237 | 87      |
| 29000 | Hamilton Downtown | Elgin Kelly                             | 8679    | 11  | 17  | 25  | 35  | 64  | 165 | 33.3 | 391 | 143     |
| 29114 | Hamilton Mountain | Vickers Rd./E. 18th St.                 | 8221    | 6   | 10  | 15  | 22  | 43  | 111 | 21.2 | 207 | 100     |
| 29118 | Hamilton West     | Main St. W. / Hwy 403                   | 7246*   | 7   | 13  | 22  | 36  | 80  | 215 | INS  | 365 | 167     |
| 31190 | Toronto           | Bay/Wellesley St.                       | 8597    | 12  | 18  | 25  | 35  | 60  | 134 | 32.2 | 351 | 135     |
| 33003 | Toronto East      | Kennedy/Lawrence                        | 8662    | 3   | 6   | 8   | 13  | 23  | 56  | 11.7 | 183 | 52      |
| 34020 | Toronto North     | CN Tower, 301 Front St. W.              | 8570    | 9   | 18  | 27  | 41  | 75  | 203 | 37.9 | 599 | 178     |
| 35033 | Erie/Coke South   | 11800 Yonge St                          | 8082    | 14  | 24  | 36  | 55  | 113 | 276 | 53.1 | 635 | 207     |
| 35125 | Toronto West      | 125 Resources Rd                        | 7080*   | 15  | 26  | 41  | 61  | 114 | 304 | INS  | 626 | 254     |
| 44008 | Burlington        | Hwy 2/North Shore Blvd. E.              | 7036    | 5   | 12  | 22  | 35  | 69  | 198 | 32.2 | 470 | 157     |
| 44015 | Oakville          | Bronte Rd./Woburn Cres.                 | 3521*   | 6   | 11  | 17  | 27  | 59  | 165 | INS  | 344 | 101     |
| 44017 | Oakville          | 8th Line/Glenashion Dr., Halton Reserv. | 5085*   | 5   | 9   | 13  | 19  | 37  | 94  | INS  | 236 | 58      |
| 45025 | Oshawa            | Rison Rd. Public School                 | 8536    | 5   | 11  | 18  | 29  | 54  | 128 | 25.5 | 267 | 106     |
| 46089 | Brampton          | 525 Main St. N., Peel Manor             | 8334    | 4   | 9   | 17  | 29  | 65  | 174 | 28.1 | 364 | 136     |
| 46110 | Mississauga       | Mississauga General Hospital            | 2075*   | 12  | 22  | 31  | 44  | 84  | 273 | INS  | 456 | 142     |
| 47045 | Barrie            | 83 Perry St.                            | 8472    | 5   | 9   | 14  | 22  | 51  | 179 | 24.2 | 547 | 186     |
| 48006 | Newmarket         | Eagle St./McCarthy Rd.                  | 8545    | 2   | 4   | 8   | 14  | 32  | 105 | 14.1 | 249 | 105     |
| 51001 | Ottawa            | Rideau/Wurtemburg St.                   | 8021    | 4   | 8   | 12  | 21  | 45  | 114 | 20.1 | 323 | 119     |
| 54012 | Belleville        | 2 Sidney St., Water Treatment Plant     | 8664    | 5   | 7   | 10  | 15  | 31  | 97  | 15.8 | 251 | 94      |
| 59006 | Peterborough      | 10 Hospital Dr.                         | 8700    | 3   | 5   | 8   | 12  | 25  | 66  | 11.7 | 169 | 57      |
| 63200 | Thunder Bay       | 615 James St. S., Mto                   | 7840    | 5   | 8   | 12  | 19  | 42  | 134 | 20.1 | 358 | 127     |
| 71068 | Sault Ste. Marie  | Wm. Merrifield School                   | 7825    | 3   | 5   | 9   | 17  | 38  | 98  | 16.1 | 301 | 105     |
| 75010 | North Bay         | Chippewa St., Dept. National Defence    | 8573    | 3   | 6   | 9   | 15  | 37  | 114 | 16.4 | 311 | 88      |
| 77203 | Sudbury           | Science North                           | 7512    | 2   | 4   | 6   | 10  | 22  | 73  | 10.3 | 161 | 51      |

**Notes:**

\* Site does not meet requirement of 75% valid data per quarter. INS represents insufficient data for a valid mean.

\*\* CN Tower Site (Station 31190) - measurements taken at 444 m above ground level.

**Table 7: Carbon Monoxide (CO) Statistics (2003)**

Unit: parts per million (ppm)

CO 1-hour AAQC is 30 ppm

CO 8-hour AAQC is 13 ppm

| ID    | City              | Location                                | Valid h | P E R C E N T I L E S |      |      |      |      |      |      | Maximum |      | # of Times Above Criteria |    |
|-------|-------------------|---|---------|-----------------------|------|------|------|------|------|------|---------|------|---------------------------|----|
|       |                   |   |         | 10%                   | 30%  | 50%  | 70%  | 90%  | 99%  | Mean | 1h      | 8h   | 1h                        | 8h |
| 12008 | Windsor Downtown  | 467 University Ave.                     | 5035*   | 0.51                  | 0.63 | 0.74 | 0.89 | 1.20 | 1.75 | INS  | 4.34    | 2.45 | 0                         | 0  |
| 15025 | London            | 900 Highbury Ave.                       | 5759*   | 0.15                  | 0.33 | 0.47 | 0.64 | 0.84 | 1.19 | INS  | 2.43    | 1.50 | 0                         | 0  |
| 26060 | Kitchener         | West Ave./Homewood                      | 8682    | 0.21                  | 0.43 | 0.57 | 0.67 | 0.82 | 1.49 | 0.56 | 3.94    | 2.66 | 0                         | 0  |
| 29000 | Hamilton Downtown | Elgin/Kelly                             | 5310*   | 0.33                  | 0.55 | 0.69 | 0.84 | 1.08 | 1.58 | INS  | 3.09    | 1.65 | 0                         | 0  |
| 29118 | Hamilton West     | Main St. W./ Hwy 403                    | 7801    | 0.15                  | 0.35 | 0.54 | 0.69 | 1.01 | 1.53 | 0.56 | 3.37    | 1.91 | 0                         | 0  |
| 31103 | Toronto Downtown  | Bay/Wellesley St.                       | 8198    | 0.25                  | 0.38 | 0.47 | 0.57 | 0.75 | 1.14 | 0.49 | 2.40    | 1.42 | 0                         | 0  |
| 35033 | Eriebeke South    | 185 Judson St.                          | 6596*   | 0.28                  | 0.52 | 0.61 | 0.70 | 0.90 | 1.88 | INS  | 3.52    | 2.54 | 0                         | 0  |
| 35125 | Toronto West      | 125 Resources Rd.                       | 7081*   | 0.29                  | 0.40 | 0.48 | 0.57 | 0.77 | 1.45 | INS  | 3.44    | 2.47 | 0                         | 0  |
| 44008 | Burlington        | Hwy 2/North Shore Blvd. E.              | 8483    | 0.21                  | 0.34 | 0.43 | 0.52 | 0.65 | 1.13 | 0.44 | 2.60    | 1.71 | 0                         | 0  |
| 44015 | Oakville          | Bromie Rd./Woburn Cres.                 | 3514*   | 0.36                  | 0.56 | 0.67 | 0.74 | 0.90 | 1.32 | INS  | 3.39    | 1.75 | 0                         | 0  |
| 44017 | Oakville          | 8th Line/Glenashton Dr., Halton Reserv. | 5071*   | 0.55                  | 0.62 | 0.68 | 0.76 | 1.00 | 1.32 | INS  | 1.81    | 1.43 | 0                         | 0  |
| 46089 | Brampton          | 525 Main St. N., Peel Manor             | 7924    | 0.44                  | 0.56 | 0.63 | 0.72 | 0.94 | 1.77 | 0.68 | 5.17    | 2.33 | 0                         | 0  |
| 46110 | Mississauga       | Mississauga General Hospital            | 8662    | 0.12                  | 0.31 | 0.56 | 0.82 | 1.43 | 2.33 | 0.66 | 5.36    | 3.34 | 0                         | 0  |
| 47045 | Barrie            | 83 Perry St.                            | 8256    | 0.18                  | 0.29 | 0.37 | 0.50 | 0.80 | 1.62 | 0.45 | 5.30    | 3.12 | 0                         | 0  |
| 48006 | Newmarket         | Eagle St./McCaffrey Rd.                 | 8191    | 0.16                  | 0.31 | 0.41 | 0.50 | 0.71 | 1.29 | 0.43 | 7.05    | 2.22 | 0                         | 0  |
| 51001 | Ottawa            | Rideau/Wurtenburg St.                   | 7224    | 0.34                  | 0.44 | 0.50 | 0.60 | 0.84 | 1.31 | 0.55 | 2.24    | 1.54 | 0                         | 0  |
| 54012 | Belleville        | 2 Sidney St., Water Treatment Plant     | 8082    | 0.13                  | 0.24 | 0.37 | 0.52 | 0.69 | 0.94 | 0.40 | 1.53    | 1.17 | 0                         | 0  |
| 59006 | Peterborough      | 10 Hospital Dr.                         | 8583    | 0.09                  | 0.24 | 0.35 | 0.50 | 0.72 | 1.17 | 0.39 | 2.89    | 1.53 | 0                         | 0  |
| 63200 | Thunder Bay       | 615 James St. S., Mto                   | 8205    | 0.19                  | 0.35 | 0.46 | 0.62 | 0.81 | 1.43 | 0.51 | 4.07    | 2.82 | 0                         | 0  |
| 77203 | Sudbury           | Science North                           | 8358    | 0.10                  | 0.19 | 0.25 | 0.33 | 0.59 | 1.14 | 0.31 | 6.30    | 4.48 | 0                         | 0  |

Notes:

\* Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.

Table 8: Sulphur Dioxide (SO<sub>2</sub>) Statistics (2003)

Unit: parts per billion (ppb)  
 SO<sub>2</sub> 1-hour AAQC is 250 ppb  
 SO<sub>2</sub> 24-hour AAQC is 100 ppb  
 SO<sub>2</sub> 1-year AAQC is 20 ppb

| ID    | City              | Location                                | Valid h | P E R C E N T I L E S |     |     |     |     | Mean | Maximum |     | # of Times Above Criteria |     |   |
|-------|-------------------|---|---------|-----------------------|-----|-----|-----|-----|------|---------|-----|---------------------------|-----|---|
|       |                   |   |         | 10%                   | 30% | 50% | 70% | 90% |      | 1h      | 24h | 1h                        | 24h |   |
| 12008 | Windsor Downtown  | 467 University Ave.                     | 8564    | 1                     | 2   | 3   | 6   | 14  | 38   | 5.9     | 98  | 41                        | 0   | 0 |
| 12016 | Windsor West      | College/South St.                       | 6656*   | 0                     | 2   | 4   | 7   | 15  | 41   | INS     | 110 | 31                        | 0   | 0 |
| 14064 | Sarnia            | Front St./Cn Tracks, Centennial Park    | 8017    | 0                     | 1   | 2   | 4   | 15  | 91   | 7.1     | 181 | 63                        | 0   | 0 |
| 15025 | London            | 900 Highway Ave.                        | 2538*   | 0                     | 0   | 2   | 4   | 7   | 17   | INS     | 37  | 19                        | 0   | 0 |
| 20060 | Kitchener         | West Ave/Homewood                       | 8675    | 0                     | 1   | 2   | 3   | 6   | 16   | 3.0     | 38  | 17                        | 0   | 0 |
| 27067 | St. Catharines    | Argyle Cres., Pump Stn.                 | 4111*   | 1                     | 1   | 3   | 4   | 8   | 19   | INS     | 61  | 15                        | 0   | 0 |
| 29000 | Hamilton Downtown | Elgin/Kelly                             | 8622    | 0                     | 1   | 2   | 5   | 13  | 43   | 5.0     | 118 | 30                        | 0   | 0 |
| 29114 | Hamilton Mountain | Vickers Rd./E. 18th St.                 | 8565    | 0                     | 1   | 3   | 6   | 13  | 32   | 5.3     | 109 | 31                        | 0   | 0 |
| 29118 | Hamilton West     | Main St. W./ Hwy 403                    | 7598    | 0                     | 1   | 3   | 5   | 9   | 22   | 4.0     | 75  | 15                        | 0   | 0 |
| 31103 | Toronto Downtown  | Bay/Wellesley St.                       | 8694    | 0                     | 1   | 2   | 3   | 8   | 21   | 3.2     | 54  | 21                        | 0   | 0 |
| 35033 | Eriebeke South    | 185 Judson St.                          | 6655*   | 0                     | 1   | 2   | 3   | 8   | 23   | INS     | 63  | 18                        | 0   | 0 |
| 35125 | Toronto West      | 125 Resources Rd.                       | 8683    | 1                     | 1   | 2   | 3   | 6   | 19   | 2.9     | 107 | 17                        | 0   | 0 |
| 44008 | Burlington        | Hwy 2/North Shore Blvd. E.              | 8585    | 0                     | 1   | 1   | 3   | 6   | 16   | 2.5     | 39  | 13                        | 0   | 0 |
| 44015 | Oakville          | Bronte Rd./Woburn Cres.                 | 3556*   | 1                     | 2   | 3   | 6   | 16  | 43   | INS     | 131 | 45                        | 0   | 0 |
| 44017 | Oakville          | 8th Line/Glenashion Dr., Hutton Reserv. | 5063*   | 0                     | 0   | 1   | 2   | 6   | 18   | INS     | 48  | 11                        | 0   | 0 |
| 46089 | Brampton          | 525 Main St. N., Peel Manor             | 8703    | 0                     | 1   | 1   | 2   | 6   | 16   | 2.3     | 82  | 17                        | 0   | 0 |
| 46110 | Mississauga       | Mississauga General Hospital            | 8661    | 0                     | 1   | 1   | 2   | 6   | 17   | 2.5     | 103 | 16                        | 0   | 0 |
| 47045 | Barrie            | 83 Perry St.                            | 8647    | 0                     | 0   | 1   | 2   | 4   | 11   | 1.6     | 37  | 18                        | 0   | 0 |
| 48006 | Newmarket         | Eagle St./Mcandirey Rd.                 | 7821    | 0                     | 0   | 1   | 2   | 4   | 13   | 1.7     | 82  | 27                        | 0   | 0 |
| 51001 | Ottawa            | Rideau/Wurtenburg St.                   | 6341*   | 0                     | 1   | 1   | 2   | 5   | 13   | INS     | 45  | 9                         | 0   | 0 |
| 54012 | Belleville        | 2 Sidney St., Water Treatment Plant     | 8674    | 0                     | 1   | 1   | 1   | 3   | 8    | 1.5     | 17  | 7                         | 0   | 0 |
| 59006 | Peterborough      | 10 Hospital Dr.                         | 7642    | 0                     | 0   | 1   | 1   | 4   | 10   | 1.3     | 24  | 9                         | 0   | 0 |
| 63200 | Thunder Bay       | 615 James St. S., Mto                   | 8722    | 0                     | 0   | 0   | 0   | 2   | 9    | 0.6     | 62  | 12                        | 0   | 0 |
| 71068 | South St. Marie   | Wm. Merrifield School                   | 8675    | 0                     | 0   | 1   | 1   | 3   | 28   | 2.0     | 121 | 26                        | 0   | 0 |
| 77203 | Sudbury           | Science North                           | 8661    | 0                     | 0   | 0   | 1   | 4   | 31   | 2.0     | 226 | 24                        | 0   | 0 |

Notes:

\* Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.

**Table 9: Total Reduced Sulphur (TRS) Statistics (2003)**

Unit: parts per billion (ppb)

TRS 1-hour AAQC is 27 ppb

| ID    | City              | Location                             | Valid h | 10% | 30% | 50% | 70% | 90% | 99% | Mean | Maximum<br>1h 24h | # of Times<br>Above Criterion |
|-------|-------------------|--------------------------------------|---------|-----|-----|-----|-----|-----|-----|------|-------------------|-------------------------------|
| 12016 | Windsor West      | College/South St.                    | 4700    | 0   | 0   | 0   | 1   | 1   | 6   | INS  | 39                | 2                             |
| 14064 | Sarnia            | Front St./Cn Tracks, Centennial Park | 7489    | 0   | 0   | 1   | 1   | 1   | 2   | 0.7  | 4                 | 0                             |
| 29000 | Hamilton Downtown | Elgin/Kelly                          | 8664    | 0   | 0   | 0   | 0   | 2   | 5   | 0.4  | 20                | 0                             |
| 29114 | Hamilton Mountain | Vickers Rd./E. 18th St.              | 6882*   | 0   | 0   | 1   | 1   | 2   | 5   | 0.9  | 10                | 0                             |
| 29118 | Hamilton West     | Main St. W./Hwy-403                  | 5205*   | 0   | 1   | 1   | 1   | 2   | 4   | INS  | 12                | 0                             |
| 44015 | Oakville          | Bronte Rd./Woburn Cres.              | 3557*   | 0   | 0   | 1   | 1   | 1   | 3   | INS  | 74                | 3                             |
| 63200 | Thunder Bay       | 615 James St. S., Mto                | 8407    | 0   | 0   | 0   | 0   | 0   | 2   | 0.1  | 10                | 0                             |
| 71068 | Sault Ste. Marie  | Wm. Merrifield School                | 8156    | 0   | 0   | 0   | 1   | 1   | 3   | 0.4  | 16                | 0                             |

**Notes:**

\* Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.

**Table 10: 10-Year Trend For O<sub>3</sub>**

**Annual Mean (ppb)**

| ID                    | CITY                      | 1994        | 1995        | 1996        | 1997        | 1998        | 1999        | 2000        | 2001        | 2002        | 2003        |
|-----------------------|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 12008                 | WINDSOR DOWNTOWN          | 18.0        | 18.3        | 20.4        | 20.7        | 21.4        | 21.7        | 18.6        | 20.5        | 21.9        | 22.9        |
| 13021                 | MERLIN                    | 24.2        | 28.0        | 28.6        | 27.0        | 28.4        | 27.2        | 24.6        | 27.4        | 26.0        | 29.0        |
| 14064                 | SARNIA                    | 21.4        | 22.2        | 25.2        | 24.5        | 26.1        | 26.5        | 24.3        | 25.6        | 26.5        | 24.7        |
| 15020                 | GRAND BEIND               | 30.2        | 31.3        | 31.9        | 31.2        | 31.2        | 32.5        | 32.6        | 31.6        | 29.8        | 30.7        |
| 15025                 | LONDON #                  | 23.1        | 21.7        | 23.1        | 22.8        | 25.1        | 25.8        | 21.1        | 24.2        | 25.3        | 26.9        |
| 18007                 | TIVERTON                  | 31.7        | 31.6        | 32.0        | 32.5        | 32.2        | n/a         | 32.3        | 34.7        | 33.7        | 33.2        |
| 22071                 | SIMCOE                    | 30.2        | 30.7        | 29.9        | 28.6        | 31.1        | 31.3        | 29.3        | 31.0        | 33.5        | 33.9        |
| 26060                 | KITCHENER                 | 24.4        | 25.1        | 23.8        | 23.4        | 25.4        | 25.2        | 23.0        | 25.7        | 27.3        | 28.1        |
| 27067                 | ST. CATHARINES            | 23.6        | 20.5        | 20.3        | 20.9        | 20.8        | 21.7        | 18.9        | 21.2        | 24.1        | 25.3        |
| 29000                 | HAMILTON DOWNTOWN         | 17.0        | 18.0        | 17.3        | 18.1        | 19.1        | 19.5        | 17.0        | 18.8        | 20.4        | 21.7        |
| 31103                 | TORONTO DOWNTOWN          | 16.9        | 16.6        | 12.2        | 13.7        | 17.8        | 20.2        | 19.7        | 22.0        | 24.0        | 23.6        |
| 33003                 | TORONTO EAST              | 18.2        | 19.3        | 18.9        | 18.0        | 20.6        | 21.5        | 19.6        | 21.7        | 21.0        | 21.8        |
| 35125                 | TORONTO WEST <sup>a</sup> | 17.4        | 16.3        | 17.1        | 19.4        | 20.2        | n/a         | 20.1        | 21.0        | 22.0        | 18.7        |
| 44015                 | OAKVILLE                  | 22.5        | 20.4        | 21.1        | 20.8        | 21.8        | 22.4        | 21.0        | 22.9        | 25.1        | n/a         |
| 45025                 | OSHAWA                    | 23.8        | 22.7        | 21.9        | 23.2        | 23.1        | 25.0        | 21.2        | 23.4        | 24.3        | 24.1        |
| 46110                 | MISSISSAUGA               | 19.5        | 19.2        | 19.4        | 20.0        | 20.8        | 22.2        | 19.9        | 22.4        | 23.1        | 24.8        |
| 48002                 | SIOUFFVILLE               | 25.3        | 24.4        | 26.4        | 30.1        | 31.4        | 31.2        | 27.5        | 30.5        | 30.6        | 29.4        |
| 51001                 | OTTAWA                    | 19.7        | 20.9        | 18.9        | 20.6        | 19.1        | 21.2        | 19.9        | 25.0        | 24.9        | 24.8        |
| 56051                 | CORNWALL                  | 21.7        | 23.5        | 21.0        | 22.8        | 24.2        | 25.80       | 24.0        | 29.0        | 24.8        | 25.9        |
| 77203                 | SUIDBURY                  | 27.1        | 29.7        | 28.1        | 28.0        | 29.1        | 30.7        | 26.1        | 29.1        | 29.2        | 28.5        |
| <b>COMPOSITE MEAN</b> |                           | <b>23.9</b> | <b>23.4</b> | <b>23.4</b> | <b>24.1</b> | <b>25.1</b> | <b>25.1</b> | <b>23.0</b> | <b>25.4</b> | <b>25.9</b> | <b>26.2</b> |

*Notes:*

<sup>a</sup> Site change from King Rectory (15001) to 900 Highway Ave (15025) in 1995.

<sup>b</sup> Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available



**Table 11: 10-Year Trend For NO  
Annual Mean (ppb)**

| ID                    | CITY                      | 1994        | 1995        | 1996        | 1997        | 1998        | 1999        | 2000        | 2001        | 2002       | 2003       |
|-----------------------|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|
| 12008                 | WINDSOR DOWNTOWN          | 17.0        | 15.0        | 16.0        | 15.9        | 16.3        | 13.3        | 13.9        | 11.0        | 10.9       | n/a        |
| 14064                 | SARNIA                    | 9.0         | 6.0         | 7.0         | 7.0         | 6.9         | 7.1         | 8.9         | 6.7         | 7.1        | 5.0        |
| 15025                 | LONDON #                  | 18.0        | 15.0        | 10.0        | 7.6         | 9.1         | 8.5         | 8.0         | 6.6         | n/a        | n/a        |
| 26060                 | KITCHENER                 | 8.0         | 7.0         | 7.0         | 5.5         | 6.9         | 6.6         | 7.4         | 5.7         | 3.8        | n/a        |
| 27067                 | ST. CATHARINES            | 10.0        | 10.0        | 13.0        | 10.3        | 16.3        | 11.7        | 12.4        | 13.8        | n/a        | n/a        |
| 29000                 | HAMILTON DOWNTOWN         | 18.0        | 16.0        | 15.0        | 10.8        | 12.6        | 12.0        | 14.7        | 11.5        | 10.4       | 11.7       |
| 31103                 | TORONTO DOWNTOWN          | 25.0        | 23.0        | 42.0        | 32.9        | 24.3        | 15.8        | 14.4        | 10.0        | 8.2        | 8.7        |
| 33003                 | TORONTO EAST              | 26.0        | 24.0        | 23.0        | 24.9        | 23.2        | 20.1        | 23.0        | 17.9        | 16.1       | 17.0       |
| 34020                 | TORONTO NORTH             | 17.0        | 18.0        | 17.0        | 16.3        | 16.5        | 16.5        | 16.8        | 14.3        | 12.4       | 12.4       |
| 35125                 | TORONTO WEST <sup>^</sup> | 23.0        | 19.0        | 22.0        | 18.6        | 17.9        | 20.7        | 19.3        | 14.7        | 11.7       | n/a        |
| 44015                 | OAKVILLE                  | 15.0        | 15.0        | 16.0        | 14.9        | 15.8        | 13.0        | 16.2        | 11.9        | n/a        | n/a        |
| 45025                 | OSHAWA                    | 19.0        | 18.0        | 15.0        | 16.4        | 15.6        | 15.1        | 14.2        | 13.7        | 10.0       | 9.3        |
| 51001                 | OTTAWA                    | 11.0        | 7.0         | 8.0         | 7.0         | 7.9         | 14.8        | 11.0        | 7.3         | n/a        | 5.8        |
| 77203                 | SUDBURY                   | 5.0         | 6.0         | 6.0         | 4.9         | 3.7         | 5.0         | 4.5         | 3.7         | 3.2        | 2.6        |
| <b>COMPOSITE MEAN</b> |                           | <b>15.8</b> | <b>14.2</b> | <b>15.5</b> | <b>13.8</b> | <b>13.8</b> | <b>12.9</b> | <b>13.2</b> | <b>10.6</b> | <b>9.4</b> | <b>9.1</b> |

**Notes:**

# Site change location from King/Rectory (15001) to 9000 Highbury Ave (15025) in 1995.

<sup>^</sup> Site changed from Elmcroft Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

**Table 12: 10-Year Trend For NO<sub>2</sub>  
Annual Mean (ppb)**

| ID                    | CITY                      | 1994        | 1995        | 1996        | 1997        | 1998        | 1999        | 2000        | 2001        | 2002        | 2003        |
|-----------------------|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 12008                 | WINDSOR DOWNTOWN          | 28.0        | 25.0        | 26.0        | 23.8        | 23.8        | 22.9        | 21.6        | 19.4        | 19.1        | n/a         |
| 14064                 | SARNIA                    | 18.0        | 17.0        | 16.0        | 16.9        | 18.0        | 16.7        | 16.3        | 16.8        | 17.5        | 13.0        |
| 15025                 | LONDON #                  | 23.0        | 20.0        | 18.0        | 18.0        | 17.7        | 19.4        | 17.4        | 17.3        | n/a         | n/a         |
| 26060                 | KITCHENER                 | 14.0        | 11.0        | 13.0        | 13.7        | 16.5        | 14.0        | 14.7        | 14.1        | 11.9        | n/a         |
| 27067                 | ST. CATHARINES            | 17.0        | 14.0        | 16.0        | 13.8        | 15.7        | 16.2        | 16.9        | 20.0        | n/a         | n/a         |
| 29000                 | HAMILTON DOWNTOWN         | 22.0        | 19.0        | 22.0        | 18.6        | 22.4        | 21.6        | 21.8        | 22.5        | 20.9        | 21.3        |
| 31103                 | TORONTO DOWNTOWN          | 30.0        | 30.0        | 34.0        | 31.7        | 27.7        | 26.9        | 26.8        | 27.1        | 23.3        | 23.2        |
| 33003                 | TORONTO EAST              | 22.0        | 25.0        | 23.0        | 23.4        | 25.5        | 24.6        | 23.7        | 22.9        | 22.0        | 21.3        |
| 34020                 | TORONTO NORTH             | 20.0        | 18.0        | 22.0        | 20.2        | 23.4        | 24.3        | 22.7        | 22.0        | 21.0        | 20.4        |
| 35125                 | TORONTO WEST <sup>^</sup> | 27.0        | 25.0        | 25.0        | 26.7        | 26.2        | 24.7        | 23.2        | 21.2        | 20.3        | n/a         |
| 44015                 | OAKVILLE                  | 17.0        | 17.0        | 20.0        | 20.8        | 17.1        | 17.2        | 17.2        | 16.2        | n/a         | n/a         |
| 45025                 | OSHAWA                    | 18.0        | 20.0        | 19.0        | 18.6        | 20.0        | 21.5        | 19.7        | 19.0        | 17.2        | 16.2        |
| 51001                 | OTTAWA                    | 19.0        | 16.0        | 13.0        | 12.5        | 12.4        | 12.2        | 13.8        | 14.3        | n/a         | 13.7        |
| 77203                 | SIDDURRY                  | 11.0        | 12.0        | 8.0         | 7.4         | 6.0         | 7.7         | 8.6         | 7.5         | 8.3         | 7.8         |
| <b>COMPOSITE MEAN</b> |                           | <b>19.1</b> | <b>17.9</b> | <b>18.3</b> | <b>17.7</b> | <b>19.5</b> | <b>18.0</b> | <b>18.9</b> | <b>18.6</b> | <b>18.2</b> | <b>17.1</b> |

**Notes:**

# Site change location from King Rectory (15001) to 900 Highbury Ave (15025) in 1995.

<sup>^</sup> Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

**Table 13: 10-Year Trend For NO<sub>x</sub>**  
Annual Mean (ppb)

| ID                    | CITY             | 1994        | 1995        | 1996        | 1997        | 1998        | 1999        | 2000        | 2001        | 2002        | 2003        |
|-----------------------|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 12008                 | WINDSOR DOWNTOWN | 42.0        | 38.0        | 39.0        | 39.3        | 38.5        | 37.0        | 36.0        | 30.5        | 29.2        | n/a         |
| 14064                 | SARNIA           | 28.0        | 23.0        | 23.0        | 24.9        | 25.1        | 23.5        | 25.0        | 23.6        | 24.6        | 18.1        |
| 15025                 | LONDON #         | 38.0        | 32.0        | 28.0        | 24.4        | 25.8        | 25.9        | 24.7        | 23.1        | n/a         | n/a         |
| 26060                 | KITCHENER        | 23.0        | 20.0        | 20.0        | 19.2        | 23.9        | 20.5        | 21.9        | 19.5        | 15.5        | n/a         |
| 27067                 | ST. CATHARINES   | 28.0        | 25.0        | 29.0        | 24.5        | 31.7        | 24.8        | 28.8        | 33.5        | n/a         | n/a         |
| 29000                 | HAMILTON         | 40.0        | 35.0        | 37.0        | 29.5        | 34.7        | 34.0        | 37.0        | 34.4        | 31.4        | 33.3        |
| 31103                 | TORONTO DOWNTOWN | 54.0        | 55.0        | 76.0        | 64.3        | 51.6        | 41.9        | 40.4        | 36.6        | 31.5        | 32.2        |
| 33003                 | TORONTO EAST     | 50.0        | 49.0        | 45.0        | 47.5        | 48.3        | 44.9        | 46.3        | 40.3        | 37.7        | 37.9        |
| 34020                 | TORONTO NORTH    | 38.0        | 36.0        | 39.0        | 36.7        | 39.9        | 40.7        | 39.3        | 36.2        | 33.4        | 33.1        |
| 35125                 | TORONTO WEST^    | 49.0        | 45.0        | 47.0        | 45.2        | 43.7        | 45.4        | 42.3        | 35.9        | 32.0        | n/a         |
| 44015                 | OAKVILLE         | 34.0        | 32.0        | 33.0        | 32.8        | 30.0        | 29.6        | 33.0        | 27.8        | n/a         | n/a         |
| 45025                 | OSHAWA           | 37.0        | 36.0        | 35.0        | 34.9        | 35.1        | 35.8        | 33.6        | 32.6        | 27.2        | 25.5        |
| 51001                 | OTTAWA           | 28.0        | 22.0        | 25.0        | 19.6        | 22.8        | 27.5        | 24.2        | 21.0        | n/a         | 20.1        |
| 77203                 | SUDBURY          | 17.0        | 17.0        | 14.0        | 12.5        | 9.4         | 12.7        | 12.6        | 10.8        | 10.9        | 10.3        |
| <b>COMPOSITE MEAN</b> |                  | <b>36.1</b> | <b>33.2</b> | <b>35.0</b> | <b>32.5</b> | <b>32.9</b> | <b>31.7</b> | <b>31.8</b> | <b>29.0</b> | <b>27.3</b> | <b>26.3</b> |

**Notes:**

# Site change location from King/Rectorry (15001) to 900 Highbury Ave (15025) in 1995

^ Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

**Table 14: 10-Year Trend For CO  
Annual Mean (ppm)**

| ID             | CTTY              | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|----------------|-------------------|------|------|------|------|------|------|------|------|------|------|
| 12008          | WINDSOR DOWNTOWN  | 1.0  | 0.9  | 0.8  | 0.6  | 0.7  | 0.6  | 0.3  | 0.3  | 0.5  | n/a  |
| 14064          | SARNIA            | 0.2  | 0.1  | 0.2  | 0.2  | 0.3  | 0.3  | 0.4  | 0.3  | n/a  | n/a  |
| 15025          | LONDON #          | 0.5  | 0.1  | 0.0  | 0.3  | 0.1  | 0.3  | 0.2  | 0.1  | 0.1  | n/a  |
| 26060          | KITCHENER         | 0.3  | 0.3  | 0.4  | 0.2  | 0.3  | 0.4  | 0.4  | 0.4  | 0.3  | 0.6  |
| 27067          | ST. CATHARINES    | 0.4  | 0.2  | 0.3  | 0.1  | 0.4  | 0.2  | 0.4  | 0.3  | n/a  | n/a  |
| 29000          | HAMILTON DOWNTOWN | 0.8  | 0.6  | 1.0  | 0.7  | 1.1  | 0.8  | 0.8  | 0.7  | n/a  | n/a  |
| 31103          | TORONTO WEST^     | 1.0  | 0.7  | 1.3  | 1.2  | 1.1  | n/a  | 1.3  | 0.9  | 0.7  | 0.5  |
| 35125          | TORONTO WEST^     | 0.7  | 0.8  | 0.7  | 1.0  | 1.0  | 1.0  | 1.8  | 1.0  | 0.6  | n/a  |
| 44015          | OAKVILLE          | 0.7  | 0.5  | 0.7  | 0.3  | 0.2  | 0.2  | 0.4  | 0.4  | 0.6  | n/a  |
| 51001          | OTTAWA            | 0.8  | 0.6  | 0.7  | 0.4  | 1.1  | 0.8  | 0.7  | 0.6  | 0.7  | 0.6  |
| 77203          | SUDBURY           | 0.1  | 0.0  | 0.1  | 0.0  | 0.0  | 0.0  | 0.2  | 0.4  | 0.6  | 0.3  |
| COMPOSITE MEAN |                   | 0.7  | 0.5  | 0.6  | 0.5  | 0.6  | 0.3  | 0.6  | 0.5  | 0.5  | 0.5  |

**Notes:**

# Site change location from King Rectory (15001) to 900 Highbury Ave (15025) in 1995.

^ Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

**Table 15: 10-Year Trend For SO<sub>2</sub>**

Annual Mean (ppb)  
SO<sub>2</sub> annual AAQC = 20 ppb

| ID                    | CITY                      | 1994       | 1995       | 1996       | 1997       | 1998       | 1999       | 2000       | 2001       | 2002       | 2003       |
|-----------------------|---------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 12008                 | WINDSOR DOWNTOWN          | 6.0        | 5.0        | 10.0       | 6.7        | 7.4        | 6.7        | 6.2        | 6.1        | 5.7        | 5.9        |
| 14064                 | SARNIA                    | 9.0        | 6.0        | 7.0        | 8.5        | 10.3       | 11.8       | 10.4       | 12.5       | 10.4       | 7.1        |
| 15025                 | LONDON #                  | 4.0        | 2.0        | 3.0        | 2.5        | 3.2        | 4.9        | 3.5        | 3.5        | 2.2        | n/a        |
| 22071                 | SIMCOE                    | 2.0        | 2.0        | 3.0        | 3.2        | 3.8        | 3.7        | 4.3        | 5.0        | 3.4        | n/a        |
| 26060                 | KITCHENER                 | 3.0        | 2.0        | 3.0        | 3.1        | 3.0        | 3.4        | 3.2        | 3.4        | 2.8        | 3.0        |
| 27067                 | ST. CATHARINES            | 3.0        | 5.0        | 6.0        | 5.8        | 4.0        | 2.2        | 3.0        | 3.3        | n/a        | n/a        |
| 29000                 | HAMILTON DOWNTOWN         | 5.0        | 8.0        | 9.0        | 5.8        | 6.3        | 6.6        | 5.1        | 6.0        | 4.9        | 5.0        |
| 31103                 | TORONTO DOWNTOWN          | 3.0        | 3.0        | 5.0        | 5.3        | 4.0        | n/a        | 4.7        | 5.0        | 4.0        | 3.2        |
| 35125                 | TORONTO WEST <sup>1</sup> | 4.0        | 3.0        | 4.0        | 4.9        | 4.1        | n/a        | 3.6        | 4.0        | 5.4        | 2.9        |
| 44008                 | BURLINGTON                | 4.0        | 2.0        | 4.0        | 5.1        | 3.2        | 4.9        | 5.2        | 4.9        | 5.9        | 2.5        |
| 44015                 | OAKVILLE                  | 4.0        | 2.0        | 5.0        | 4.8        | 5.1        | 4.0        | 4.8        | 3.7        | 4.3        | n/a        |
| 46110                 | MISSISSAUGA               | 3.0        | 2.0        | n/a        | n/a        | 5.1        | 4.7        | 4.6        | 4.7        | n/a        | 2.5        |
| 51001                 | OTTAWA                    | 1.0        | 1.0        | 5.0        | 6.3        | 3.4        | 4.2        | 4.1        | 2.3        | 2.9        | n/a        |
| 56051                 | CORNWALL                  | 12.0       | 5.0        | 5.0        | 3.9        | 5.5        | 3.9        | 3.5        | 4.3        | n/a        | n/a        |
| 63200                 | THUNDER BAY               | 0.0        | 0.0        | 0.0        | 0.4        | 0.4        | 0.4        | 0.3        | 0.9        | 0.5        | 0.6        |
| 77203                 | SUDBURY                   | 3.0        | 4.0        | 5.0        | 3.5        | 5.2        | 3.0        | 4.2        | 5.8        | 3.1        | 2.0        |
| <b>COMPOSITE MEAN</b> |                           | <b>3.0</b> | <b>2.4</b> | <b>3.5</b> | <b>3.3</b> | <b>3.5</b> | <b>3.6</b> | <b>4.4</b> | <b>4.7</b> | <b>4.3</b> | <b>3.5</b> |

**Notes:**

# Site change location from King/Rectory (15001) to 900 Highbury Ave (15025) in 1995.

<sup>1</sup> Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

**Table 16: 10-Year Trend For TRS  
Annual Mean (ppb)**

| ID                    | CITY              | 1994        | 1995        | 1996        | 1997        | 1998        | 1999        | 2000        | 2001        | 2002        | 2003        |
|-----------------------|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 12016                 | WINDSOR WEST      | 0.7         | 0.9         | 0.8         | 1.6         | 1.3         | 0.5         | 1.1         | 1.0         | 2.1         | n/a         |
| 14064                 | SARNIA            | 0.6         | 0.3         | 0.3         | 0.2         | 0.3         | 0.5         | 0.7         | 0.7         | 0.9         | 0.7         |
| 29000                 | HAMILTON DOWNTOWN | 1.1         | 1.2         | 1.4         | 1.0         | 0.7         | 0.6         | 0.7         | 0.9         | 0.5         | 0.4         |
| 29114                 | HAMILTON MOUNTAIN | 0.7         | 0.6         | 1.1         | 0.6         | 1.2         | n/a         | 0.5         | 0.7         | 0.4         | 0.9         |
| 29118                 | HAMILTON WEST     | 0.7         | 0.9         | 1.3         | 0.8         | 0.9         | 0.9         | 0.6         | 0.5         | 0.3         | n/a         |
| 44015                 | OAKVILLE          | 1.3         | 0.3         | 1.3         | 1.3         | 1.1         | 1.4         | 1.2         | 0.5         | 1.1         | n/a         |
| 63200                 | THUNDER BAY       | 0.3         | 0.3         | 0.1         | 0.1         | 0.1         | 0.2         | 0.2         | 0.3         | 0.2         | 0.1         |
| 71068                 | SAULT STE. MARIE  | 0.5         | 0.4         | 0.5         | 0.3         | 0.2         | 0.2         | 0.3         | 0.8         | 0.4         | 0.4         |
| 77203                 | SUDBURY           | 0.5         | 0.5         | 0.3         | 0.3         | 0.4         | 0.2         | 0.1         | 0.2         | 0.5         | n/a         |
| <b>COMPOSITE MEAN</b> |                   | <b>0.72</b> | <b>0.59</b> | <b>0.77</b> | <b>0.69</b> | <b>0.69</b> | <b>0.56</b> | <b>0.60</b> | <b>0.62</b> | <b>0.71</b> | <b>0.50</b> |

**Notes:**

*n/a - data not available*

**Table 17: Stations Used in Gaseous Trends**

| City                          | Station # (Sampling Period)              |
|-------------------------------|--|
| Burlington                    | 44008 (1994 - 2003)                      |
| Cornwall                      | 56051 (1994 - 2003)                      |
| Etobicoke South               | 35033 (1994 - 2003)                      |
| Grand Bend                    | 15020 (1994 - 2003)                      |
| Hamilton Downtown             | 29000 (1994 - 2003)                      |
| Hamilton Mountain             | 29114 (1994 - 2003)                      |
| Hamilton West                 | 29118 (1994 - 2003)                      |
| Kitchener                     | 26060 (1994 - 2003)                      |
| London                        | 15001 (1994 - 1995); 15025 (1996 - 2003) |
| Merlin                        | 13021 (1994 - 2003)                      |
| Mississauga                   | 46110 (1994 - 2003)                      |
| Oakville                      | 44015 (1994 - 2003)                      |
| Oshawa                        | 45025 (1994 - 2003)                      |
| Ottawa                        | 51001 (1994 - 2003)                      |
| Sarnia                        | 14064 (1994 - 2003)                      |
| Sault Ste. Marie              | 71068 (1994 - 2003)                      |
| Simcoe                        | 22071 (1994 - 2003)                      |
| St. Catharines                | 27067 (1994 - 2003)                      |
| Stouffville                   | 48002 (1994 - 2003)                      |
| Sudbury                       | 77203 (1994 - 2003)                      |
| Thunder Bay                   | 63200 (1994 - 2003)                      |
| Tiverton                      | 18007 (1994 - 2003)                      |
| Toronto Downtown              | 31103 (1994 - 2003)                      |
| Toronto East (Scarborough)    | 33003 (1994 - 2003)                      |
| Toronto North (North York)    | 34020 (1994 - 2003)                      |
| Toronto West (Etobicoke West) | 35003 (1994 - 2002); 35125 (2003)        |
| Windsor Downtown              | 12008 (1994 - 2003)                      |
| Windsor West                  | 12016 (1994 - 2003)                      |



**Table 18: List of Volatile Organic Compounds (VOCs)**

| Alkanes                         | Alkenes                  | Alkynes   | Aromatics                   | Halogenated                |
|---------------------------------|--------------------------|-----------|-----------------------------|----------------------------|
| Ethane                          | Ethylene                 | Acetylene | Benzene                     | Freon 11                   |
| Propane                         | 1,3-Butadiene            | 1-Butyne  | Toluene                     | Dibromomethane             |
| Butane                          | 1-Butene + Isobutene     |           | Styrene                     | Carbon tetrachloride       |
| Isobutane                       | trans-2-Butene           |           | Ethylbenzene                | Dibromochloromethane       |
| Cyclopentane                    | cis-2-Butene             |           | Indane                      | Bromoform                  |
| Pentane                         | Cyclopentene             |           | Iso-Propylbenzene           | Bromodichloromethane       |
| Isopentane                      | Isoprene                 |           | n-Propylbenzene             | Chloroform                 |
| 2,2-Dimethylpropane             | trans-2-Pentene          |           | sec-Butylbenzene            | Chloromethane              |
| Cyclohexane                     | 2-Methyl-1-Butene        |           | tert-Butylbenzene           | Dichloromethane            |
| Methylcyclopentane              | cis-2-Pentene            |           | iso-Butylbenzene            | Freon 22                   |
| 2,2-Dimethylbutane              | 1-Pentene                |           | Hexylbenzene                | Bromomethane               |
| 2,3-Dimethylbutane              | 2-Methyl-2-Butene        |           | <i>m</i> + <i>p</i> -Xylene | Bromotrichloromethane      |
| 3-Methylpentane                 | Cyclohexene              |           | <i>o</i> -Xylene            | cis-1,2-Dichloroethylene   |
| 2-Methylpentane                 | 1-Methylcyclopentene     |           | 3-Ethyltoluene              | Tetrachloroethylene        |
| Hexane                          | 2-Ethyl-1-Butene         |           | 4-Ethyltoluene              | Chloroethane               |
| Methylcyclohexane               | cis-2-Hexene             |           | 1,3,5-Trimethylbenzene      | Trichloroethylene          |
| 2,2,3-Trimethylbutane           | 1-Hexene                 |           | 2-Ethyltoluene              | trans-1,2-Dichloroethylene |
| 3-Methylheptane                 | 3-Methyl-1-Pentene       |           | 1,2,4-Trimethylbenzene      | 1,2-Dichloroethane         |
| 2-Methylheptane                 | trans-4-Methyl-2-Pentene |           | 1,2,3-Trimethylbenzene      | 1,1-Dichloroethane         |
| 4-Methylheptane                 | cis-4-Methyl-2-Pentene   |           | 1,3-Diethylbenzene          | 1,1,2-Trichloroethane      |
| Heptane                         | 4-Methyl-1-Pentene       |           | Naphthalene                 | Freon 114                  |
| 3-Methylhexane                  | trans-3-Methyl-2-Pentene |           | <i>p</i> -Cymene            | Freon 12                   |
| 2,2-Dimethylpentane             | trans-2-Hexene           |           | 1,4-Diethylbenzene          | 1,1-Dichloroethylene       |
| 2,4-Dimethylpentane             | cis-3-Methyl-2-Pentene   |           | n-Butylbenzene              | Vinyl chloride             |
| 2,3-Dimethylpentane             | 1-Methylcyclohexene      |           | 1,2-Diethylbenzene          | 1,1,1-Trichloroethane      |
| 2-Methylhexane                  | cis-2-Heptene            |           |                             | 1,1,2,2-Tetrachloroethane  |
| cis-1,4-Dimethylcyclohexane     | trans-3-Heptene          |           |                             | Trans-1,3-Dichloropropene  |
| + trans-1,3-Dimethylcyclohexane | 1-Heptene                |           |                             | 1,2-Dichloropropane        |
| cis-1,3-Dimethylcyclohexane     | cis-3-Heptene            |           |                             | cis-1,3-Dichloropropene    |
| trans-1,4-Dimethylcyclohexane   | trans-2-Heptene          |           |                             | Hexachlorobutadiene        |
| trans-1,2-Dimethylcyclohexane   | 1-Octene                 |           |                             | 1,4-Dichlorobutane         |
| 2,2,4-Trimethylpentane          | trans-2-Octene           |           |                             | Chlorobenzene              |
| 2,2-Dimethylhexane              | 1-Nonene                 |           |                             | 1,3-Dichlorobenzene        |
| Octane                          | 1-Decene                 |           |                             | 1,4-Dichlorobenzene        |
| 2,4-Dimethylhexane              | Propylene                |           |                             | 1,2,4-Trichlorobenzene     |
| 2,5-Dimethylhexane              |                          |           |                             | 1,2-Dichlorobenzene        |
| 2,3,4-Trimethylpentane          |                          |           |                             |                            |
| 2,2,5-Trimethylhexane           |                          |           |                             |                            |
| Nonane                          |                          |           |                             |                            |
| 3,6-Dimethyloctane              |                          |           |                             |                            |
| Decane                          |                          |           |                             |                            |
| Undecane                        |                          |           |                             |                            |
| Dodecane                        |                          |           |                             |                            |

Alkanes are saturated hydrocarbons in which all carbon atoms form a single bond with other atoms. Alkenes are unsaturated hydrocarbons in which some carbon atoms form a double bond with other carbon atoms. Alkynes are unsaturated hydrocarbons in which some carbon atoms form a triple bond with other carbon atoms. Aromatics are compounds where the double-bond carbon atoms occur in a ring-type pattern. Halogenated compounds are hydrocarbons which add or substitute one or more atoms of chlorine, bromine, fluorine or iodine.

Table 19: VOC Annual Statistics at Egbert (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds              | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | N<br>75% | I<br>90% | L<br>95% | S<br>Max | Min   | Mean  | Std.Dev. |
|------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|----------|-------|-------|----------|
| 1,1,1-Trichloroethane  | 113             | 0        | 0.148   | 0.153    | 0.163    | 0.172    | 0.178    |          | 0.195    | 0.144 | 0.163 | 0.011    |
| 1,1,2-Trichloroethane  | 113             | 113      |         |          |          |          |          |          |          |       |       |          |
| 1,2,3-Trimethylbenzene | 113             | 106      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.132    | 0.050 | 0.052 | 0.010    |
| 1,2,4-Trimethylbenzene | 113             | 91       | 0.050   | 0.050    | 0.050    | 0.050    | 0.116    |          | 0.568    | 0.050 | 0.074 | 0.078    |
| 1,2-Dichloroethane     | 113             | 107      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.065    | 0.050 | 0.050 | 0.002    |
| 1,3,5-Trimethylbenzene | 113             | 105      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.181    | 0.050 | 0.053 | 0.017    |
| 1,3-Butadiene          | 113             | 109      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.103    | 0.050 | 0.051 | 0.007    |
| 1,3-Diethylbenzene     | 113             | 113      |         |          |          |          |          |          |          |       |       |          |
| 1,4-Dichlorobenzene    | 113             | 108      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.200    | 0.050 | 0.052 | 0.015    |
| 1,4-Diethylbenzene     | 90              | 87       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.112    | 0.050 | 0.051 | 0.007    |
| 1-Butene/Isobutene     | 113             | 17       | 0.050   | 0.055    | 0.067    | 0.089    | 0.146    |          | 0.415    | 0.050 | 0.088 | 0.063    |
| 1-Butyne               | 113             | 113      |         |          |          |          |          |          |          |       |       |          |
| 1-Hexene               | 113             | 109      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.107    | 0.050 | 0.051 | 0.005    |
| 1-Pentene              | 113             | 106      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.131    | 0.050 | 0.051 | 0.009    |
| 1-Propyne              | 113             | 106      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.110    | 0.050 | 0.052 | 0.008    |
| 2,2,4-Trimethylpentane | 113             | 54       | 0.050   | 0.050    | 0.053    | 0.095    | 0.202    |          | 0.766    | 0.050 | 0.098 | 0.104    |
| 2,2,5-Trimethylhexane  | 112             | 111      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.059    | 0.050 | 0.050 | 0.001    |
| 2,2-Dimethylbutane     | 113             | 100      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.142    | 0.050 | 0.053 | 0.012    |
| 2,2-Dimethylhexane     | 113             | 113      |         |          |          |          |          |          |          |       |       |          |
| 2,2-Dimethylpentane    | 113             | 112      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.050    | 0.050 | 0.050 | 0.000    |
| 2,2-Dimethylpropane    | 113             | 113      |         |          |          |          |          |          |          |       |       |          |
| 2,3,4-Trimethylpentane | 113             | 98       | 0.050   | 0.050    | 0.050    | 0.050    | 0.064    |          | 0.273    | 0.050 | 0.058 | 0.030    |
| 2,3-Dimethylbutane     | 113             | 93       | 0.050   | 0.050    | 0.050    | 0.050    | 0.070    |          | 0.277    | 0.050 | 0.060 | 0.033    |
| 2,3-Dimethylpentane    | 113             | 86       | 0.050   | 0.050    | 0.050    | 0.050    | 0.109    |          | 0.269    | 0.050 | 0.066 | 0.039    |
| 2,4-Dimethylhexane     | 113             | 103      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.148    | 0.050 | 0.052 | 0.012    |
| 2,4-Dimethylpentane    | 113             | 104      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.164    | 0.050 | 0.053 | 0.014    |
| 2,5-Dimethylhexane     | 113             | 108      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.136    | 0.050 | 0.052 | 0.011    |
| 2-Ethyltoluene         | 113             | 102      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.216    | 0.050 | 0.055 | 0.023    |
| 2-methyl-1-butene      | 113             | 110      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.092    | 0.050 | 0.051 | 0.005    |
| 2-Methyl-2-butene      | 113             | 112      | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.088    | 0.050 | 0.050 | 0.004    |
| 2-Methylheptane        | 113             | 96       | 0.050   | 0.050    | 0.050    | 0.050    | 0.062    |          | 0.259    | 0.050 | 0.058 | 0.030    |
| 2-Methylhexane         | 113             | 59       | 0.050   | 0.050    | 0.050    | 0.082    | 0.211    |          | 0.549    | 0.050 | 0.091 | 0.088    |
| 2-Methylpentane        | 113             | 26       | 0.050   | 0.054    | 0.086    | 0.152    | 0.284    |          | 1.141    | 0.050 | 0.150 | 0.177    |
| 3-Ethyltoluene         | 113             | 93       | 0.050   | 0.050    | 0.050    | 0.050    | 0.103    |          | 0.554    | 0.050 | 0.069 | 0.067    |
| 3-Methyl-1-pentene     | 113             | 113      |         |          |          |          |          |          |          |       |       |          |
| 3-Methylheptane        | 113             | 97       | 0.050   | 0.050    | 0.050    | 0.050    | 0.062    |          | 0.255    | 0.050 | 0.058 | 0.031    |
| 3-Methylhexane         | 113             | 56       | 0.050   | 0.050    | 0.050    | 0.085    | 0.217    |          | 0.621    | 0.050 | 0.098 | 0.102    |

Table 19: VOC Annual Statistics at Egbert (2003)  
Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                       | # of<br>Samples | No. < DL | 5%    | P     | E     | R      | C     | E     | N     | T      | I     | L     | E     | S | Max | Min | Mean | Std.Dev. |
|---------------------------------|-----------------|----------|-------|-------|-------|--------|-------|-------|-------|--------|-------|-------|-------|---|-----|-----|------|----------|
| 3-Methylpentane                 | 113             | 36       | 0.050 | 0.050 | 0.050 | 0.050  | 0.071 | 0.119 | 0.284 | 0.795  | 0.050 | 0.120 | 0.129 |   |     |     |      |          |
| 4-Ethyltoluene                  | 113             | 101      | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.050 | 0.251  | 0.050 | 0.056 | 0.027 |   |     |     |      |          |
| 4-Methyl-1-pentene              | 113             | 113      |       |       |       |        |       |       |       |        |       |       |       |   |     |     |      |          |
| 4-Methylheptane                 | 113             | 110      | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.050 | 0.097  | 0.050 | 0.051 | 0.005 |   |     |     |      |          |
| Acetaldehyde                    | 52              | 0        | 0.490 | 0.716 | 1.060 | 2.471  | 4.491 | 1.516 | 0.404 | 33.768 | 0.982 | 1.286 | 0.860 |   |     |     |      |          |
| Acetone                         | 52              | 0        | 1.254 | 3.403 | 9.300 | 13.011 | 2.464 | 0.117 | 0.500 | 1.496  | 0.050 | 0.097 | 0.170 |   |     |     |      |          |
| Acetylene                       | 113             | 0        | 0.150 | 0.226 | 0.380 | 0.605  | 0.934 | 0.065 | 0.157 | 2.133  | 0.102 | 0.464 | 0.346 |   |     |     |      |          |
| a-Pinene                        | 90              | 62       | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.050 | 0.316  | 0.050 | 0.063 | 0.044 |   |     |     |      |          |
| Benzene                         | 113             | 0        | 0.150 | 0.238 | 0.348 | 0.814  | 2.133 | 0.102 | 0.464 | 0.316  | 0.050 | 0.063 | 0.044 |   |     |     |      |          |
| b-Pinene                        | 90              | 77       | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.050 | 0.106  | 0.050 | 0.058 | 0.008 |   |     |     |      |          |
| Bromoform                       | 113             | 113      |       |       |       |        |       |       |       | 9.227  | 0.129 | 1.199 | 1.539 |   |     |     |      |          |
| Bromomethane                    | 113             | 15       | 0.050 | 0.053 | 0.057 | 0.067  | 0.067 | 0.060 | 0.067 | 0.106  | 0.050 | 0.058 | 0.008 |   |     |     |      |          |
| Butane                          | 113             | 0        | 0.191 | 0.420 | 0.662 | 1.187  | 2.561 | 0.187 | 2.561 | 9.227  | 0.129 | 1.199 | 1.539 |   |     |     |      |          |
| Camphene                        | 113             | 95       | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.132 | 0.277  | 0.050 | 0.066 | 0.044 |   |     |     |      |          |
| Carbontetrachloride             | 113             | 0        | 0.556 | 0.594 | 0.617 | 0.642  | 0.617 | 0.642 | 0.677 | 0.704  | 0.529 | 0.618 | 0.039 |   |     |     |      |          |
| Chlorobenzene                   | 113             | 113      |       |       |       |        |       |       |       |        |       |       |       |   |     |     |      |          |
| Chloroethane                    | 113             | 112      | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.050 | 0.068  | 0.050 | 0.050 | 0.002 |   |     |     |      |          |
| Chloroform                      | 113             | 0        | 0.059 | 0.066 | 0.072 | 0.078  | 0.072 | 0.078 | 0.086 | 0.118  | 0.052 | 0.073 | 0.011 |   |     |     |      |          |
| Chloromethane                   | 113             | 0        | 1.025 | 1.077 | 1.130 | 1.177  | 1.130 | 1.177 | 1.216 | 1.690  | 0.949 | 1.135 | 0.087 |   |     |     |      |          |
| cis-1,2-Dimethylcyclohexane     | 113             | 113      |       |       |       |        |       |       |       |        |       |       |       |   |     |     |      |          |
| cis-1,3-Dimethylcyclohexane     | 113             | 106      | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.050 | 0.129  | 0.050 | 0.052 | 0.011 |   |     |     |      |          |
| cis-1,4+1,3-Dimethylcyclohexane | 113             | 113      |       |       |       |        |       |       |       |        |       |       |       |   |     |     |      |          |
| cis-2-Butene                    | 113             | 111      | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.050 | 0.117  | 0.050 | 0.051 | 0.007 |   |     |     |      |          |
| cis-2-Hexene                    | 113             | 113      |       |       |       |        |       |       |       |        |       |       |       |   |     |     |      |          |
| cis-2-Pentene                   | 113             | 113      |       |       |       |        |       |       |       |        |       |       |       |   |     |     |      |          |
| cis-3-Methyl-2-pentene          | 113             | 113      |       |       |       |        |       |       |       |        |       |       |       |   |     |     |      |          |
| cis-4-Methyl-2-pentene          | 113             | 111      | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.050 | 0.061  | 0.050 | 0.050 | 0.001 |   |     |     |      |          |
| Cyclohexane                     | 113             | 87       | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.090 | 0.257  | 0.050 | 0.062 | 0.035 |   |     |     |      |          |
| Cyclopentane                    | 113             | 89       | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.090 | 0.246  | 0.050 | 0.061 | 0.033 |   |     |     |      |          |
| Cyclopentene                    | 113             | 113      |       |       |       |        |       |       |       |        |       |       |       |   |     |     |      |          |
| Decane                          | 113             | 94       | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.075 | 0.419  | 0.050 | 0.065 | 0.054 |   |     |     |      |          |
| Dichloromethane                 | 113             | 0        | 0.138 | 0.162 | 0.193 | 0.271  | 0.193 | 0.271 | 0.506 | 2.872  | 0.125 | 0.294 | 0.341 |   |     |     |      |          |
| d-Limonene                      | 113             | 99       | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.081 | 0.210  | 0.050 | 0.059 | 0.029 |   |     |     |      |          |
| Dodecane                        | 113             | 104      | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.050 | 0.050 | 0.147  | 0.050 | 0.053 | 0.015 |   |     |     |      |          |
| Ethylbenzene                    | 113             | 0        | 1.111 | 1.465 | 1.971 | 2.641  | 1.971 | 2.641 | 3.966 | 8.794  | 0.952 | 2.365 | 1.418 |   |     |     |      |          |
| Ethylene                        | 113             | 36       | 0.050 | 0.050 | 0.074 | 0.150  | 0.074 | 0.150 | 0.328 | 1.208  | 0.050 | 0.152 | 0.194 |   |     |     |      |          |
| Heptane                         | 113             | 0        | 0.129 | 0.185 | 0.317 | 0.623  | 0.317 | 0.623 | 1.313 | 3.415  | 0.110 | 0.538 | 0.596 |   |     |     |      |          |

**Table 19: VOC Annual Statistics at Egbert (2003)**  
Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds                     | # of Samples | No. < DL | 5%    | P E R C E N T 25% | 50%   | 75%   | T I L E 90% | Max    | Min   | Mean  | Std.Dev. |
|-------------------------------|--------------|----------|-------|-------------------|-------|-------|-------------|--------|-------|-------|----------|
| Formaldehyde                  | 52           | 0        | 0.555 | 1.125             | 1.997 | 3.989 | 5.180       | 8.211  | 0.411 | 2.590 | 1.885    |
| Freon11                       | 113          | 0        | 1.442 | 1.495             | 1.575 | 1.756 | 1.833       | 1.972  | 1.260 | 1.618 | 0.160    |
| Freon113                      | 113          | 0        | 0.517 | 0.576             | 0.620 | 0.646 | 0.658       | 0.695  | 0.467 | 0.606 | 0.051    |
| Freon114                      | 113          | 0        | 0.097 | 0.104             | 0.109 | 0.117 | 0.123       | 0.134  | 0.093 | 0.110 | 0.009    |
| Freon12                       | 113          | 0        | 2.313 | 2.457             | 2.556 | 2.803 | 2.964       | 3.256  | 2.168 | 2.658 | 0.437    |
| Freon22                       | 113          | 0        | 0.458 | 0.500             | 0.551 | 0.606 | 0.675       | 1.049  | 0.425 | 0.567 | 0.098    |
| Heptane                       | 113          | 66       | 0.050 | 0.050             | 0.050 | 0.071 | 0.153       | 0.533  | 0.050 | 0.083 | 0.078    |
| Hexane                        | 113          | 16       | 0.050 | 0.060             | 0.102 | 0.165 | 0.291       | 1.047  | 0.050 | 0.161 | 0.176    |
| Indane                        | 113          | 111      | 0.050 | 0.050             | 0.050 | 0.050 | 0.050       | 0.066  | 0.050 | 0.050 | 0.002    |
| Isobutane                     | 113          | 4        | 0.053 | 0.134             | 0.261 | 0.483 | 0.864       | 3.254  | 0.050 | 0.430 | 0.536    |
| iso-Butylbenzene              | 113          | 113      |       |                   |       |       |             |        |       |       |          |
| Isopentane                    | 113          | 0        | 0.098 | 0.232             | 0.410 | 0.628 | 1.423       | 3.585  | 0.055 | 0.585 | 0.638    |
| Isoprene                      | 113          | 77       | 0.050 | 0.050             | 0.050 | 0.112 | 0.628       | 1.870  | 0.050 | 0.201 | 0.366    |
| iso-Propylbenzene             | 113          | 110      | 0.050 | 0.050             | 0.050 | 0.050 | 0.050       | 0.091  | 0.050 | 0.051 | 0.004    |
| m and p-Xylene                | 113          | 22       | 0.050 | 0.063             | 0.121 | 0.284 | 0.807       | 3.326  | 0.050 | 0.314 | 0.512    |
| MEK                           | 52           | 0        | 0.158 | 0.625             | 1.172 | 3.133 | 8.264       | 14.865 | 0.136 | 2.758 | 3.730    |
| Methylcyclohexane             | 113          | 91       | 0.050 | 0.050             | 0.050 | 0.050 | 0.080       | 0.280  | 0.050 | 0.061 | 0.035    |
| Methylcyclopentane            | 113          | 71       | 0.050 | 0.050             | 0.050 | 0.063 | 0.129       | 0.478  | 0.050 | 0.077 | 0.070    |
| Naphthalene                   | 113          | 101      | 0.050 | 0.050             | 0.050 | 0.050 | 0.051       | 0.204  | 0.050 | 0.056 | 0.022    |
| n-Butylbenzene                | 113          | 113      |       |                   |       |       |             |        |       |       |          |
| Nonane                        | 113          | 92       | 0.050 | 0.050             | 0.050 | 0.050 | 0.074       | 0.308  | 0.050 | 0.061 | 0.036    |
| n-Propylbenzene               | 113          | 101      | 0.050 | 0.050             | 0.050 | 0.050 | 0.055       | 0.263  | 0.050 | 0.056 | 0.026    |
| Octane                        | 113          | 88       | 0.050 | 0.050             | 0.050 | 0.050 | 0.094       | 0.306  | 0.050 | 0.064 | 0.043    |
| o-Xylene                      | 113          | 59       | 0.050 | 0.050             | 0.050 | 0.100 | 0.253       | 1.044  | 0.050 | 0.116 | 0.151    |
| p-Cymene                      | 113          | 113      |       |                   |       |       |             |        |       |       |          |
| Pentane                       | 113          | 0        | 0.081 | 0.147             | 0.243 | 0.378 | 0.714       | 2.272  | 0.053 | 0.354 | 0.368    |
| Propane                       | 113          | 0        | 0.312 | 0.701             | 1.202 | 1.831 | 3.240       | 7.679  | 0.200 | 1.555 | 1.390    |
| Propionaldehyde               | 52           | 0        | 0.067 | 0.152             | 0.222 | 0.328 | 0.447       | 1.106  | 0.062 | 0.260 | 0.180    |
| Propylene                     | 113          | 17       | 0.050 | 0.057             | 0.076 | 0.129 | 0.275       | 1.001  | 0.050 | 0.127 | 0.144    |
| sec-Butylbenzene              | 113          | 113      |       |                   |       |       |             |        |       |       |          |
| Styrene                       | 113          | 106      | 0.050 | 0.050             | 0.050 | 0.050 | 0.050       | 0.258  | 0.050 | 0.055 | 0.024    |
| Tetrachloroethylene           | 113          | 47       | 0.050 | 0.050             | 0.057 | 0.093 | 0.162       | 0.731  | 0.050 | 0.095 | 0.098    |
| Toluene                       | 113          | 0        | 0.104 | 0.207             | 0.367 | 0.634 | 1.919       | 6.036  | 0.057 | 0.731 | 1.009    |
| trans-1,2-Dimethylcyclohexane | 113          | 109      | 0.050 | 0.050             | 0.050 | 0.050 | 0.050       | 0.090  | 0.050 | 0.051 | 0.005    |
| trans-1,4-Dimethylcyclohexane | 113          | 111      | 0.050 | 0.050             | 0.050 | 0.050 | 0.050       | 0.055  | 0.050 | 0.050 | 0.001    |
| trans-2-Butene                | 113          | 111      | 0.050 | 0.050             | 0.050 | 0.050 | 0.050       | 0.124  | 0.050 | 0.051 | 0.007    |
| trans-2-Hexene                | 113          | 113      |       |                   |       |       |             |        |       |       |          |

**Table 19: VOC Annual Statistics at Egbert (2003)**

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                | # of<br>Samples | No. < DL | P E R C E N T I L E S |       |       |       |       | Max   | Min   | Mean  | Std.Dev. |
|--------------------------|-----------------|----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|----------|
|                          |                 |          | 5%                    | 25%   | 50%   | 75%   | 90%   |       |       |       |          |
| trans-2-Pentene          | 113             | 112      | 0.050                 | 0.050 | 0.050 | 0.050 | 0.050 | 0.090 | 0.050 | 0.050 | 0.004    |
| trans-3-Methyl-2-pentene | 113             | 113      |                       |       |       |       |       |       |       |       |          |
| Trichloroethylene        | 113             | 94       | 0.050                 | 0.050 | 0.050 | 0.050 | 0.100 | 0.698 | 0.050 | 0.076 | 0.086    |
| Undecane                 | 113             | 97       | 0.050                 | 0.050 | 0.050 | 0.050 | 0.061 | 0.326 | 0.050 | 0.060 | 0.038    |
| Vinylchloride            | 113             | 113      |                       |       |       |       |       |       |       |       |          |

Table 20: VOC Annual Statistics at Hamilton (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                 | # of<br>Samples | No. < DL | 5%    | P     | E     | R     | C     | N     | T     | I     | L     | E | S | Max | Min | Mean | Std.Dev. |
|---------------------------|-----------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|---|-----|-----|------|----------|
| 1,1,1-Trichloroethane     | 48              | 0        | 0.151 | 0.162 | 0.172 | 0.185 | 0.206 | 0.740 | 0.149 | 0.187 | 0.084 |   |   |     |     |      |          |
| 1,1,2,2-Tetrachloroethane | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1,1,2-Trichloroethane     | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1,1-Dichloroethane        | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1,1-Dichloroethylene      | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1,2,3-Trimethylbenzene    | 48              | 12       | 0.050 | 0.051 | 0.093 | 0.183 | 0.281 | 0.395 | 0.050 | 0.126 | 0.086 |   |   |     |     |      |          |
| 1,2,4-Trichlorobenzene    | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1,2,4-Trimethylbenzene    | 48              | 1        | 0.136 | 0.225 | 0.433 | 0.779 | 1.226 | 1.481 | 0.050 | 0.541 | 0.384 |   |   |     |     |      |          |
| 1,2-Dichlorobenzene       | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1,2-Dichloroethane        | 48              | 42       | 0.050 | 0.050 | 0.050 | 0.050 | 0.057 | 0.158 | 0.050 | 0.054 | 0.017 |   |   |     |     |      |          |
| 1,2-Dichloropropane       | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1,2-Diethylbenzene        | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1,3,5-Trimethylbenzene    | 48              | 3        | 0.050 | 0.064 | 0.122 | 0.220 | 0.344 | 0.435 | 0.050 | 0.156 | 0.105 |   |   |     |     |      |          |
| 1,3-Butadiene             | 48              | 2        | 0.050 | 0.069 | 0.103 | 0.156 | 0.243 | 0.402 | 0.050 | 0.124 | 0.079 |   |   |     |     |      |          |
| 1,3-Dichlorobenzene       | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1,3-Diethylbenzene        | 48              | 40       | 0.050 | 0.050 | 0.050 | 0.050 | 0.061 | 0.079 | 0.050 | 0.053 | 0.007 |   |   |     |     |      |          |
| 1,4-Dichlorobenzene       | 48              | 6        | 0.050 | 0.062 | 0.129 | 0.186 | 0.284 | 0.371 | 0.050 | 0.143 | 0.087 |   |   |     |     |      |          |
| 1,4-Dichlorobutane        | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1,4-Diethylbenzene        | 48              | 16       | 0.050 | 0.050 | 0.081 | 0.142 | 0.192 | 0.258 | 0.050 | 0.100 | 0.060 |   |   |     |     |      |          |
| 1-Butene/Isobutene        | 48              | 0        | 0.204 | 0.256 | 0.366 | 0.668 | 0.819 | 1.553 | 0.159 | 0.487 | 0.314 |   |   |     |     |      |          |
| 1-Butyne                  | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1-Decene                  | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1-Heptene                 | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.059 | 0.050 | 0.050 | 0.001 |   |   |     |     |      |          |
| 1-Hexene                  | 48              | 22       | 0.050 | 0.050 | 0.058 | 0.104 | 0.146 | 0.179 | 0.050 | 0.077 | 0.037 |   |   |     |     |      |          |
| 1-Methylcyclohexene       | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 1-Methylcyclopentene      | 48              | 39       | 0.050 | 0.050 | 0.050 | 0.050 | 0.074 | 0.101 | 0.050 | 0.054 | 0.011 |   |   |     |     |      |          |
| 1-Nonene                  | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.077 | 0.050 | 0.051 | 0.004 |   |   |     |     |      |          |
| 1-Octene                  | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.056 | 0.050 | 0.050 | 0.001 |   |   |     |     |      |          |
| 1-Pentene                 | 48              | 9        | 0.050 | 0.057 | 0.074 | 0.133 | 0.195 | 0.249 | 0.050 | 0.098 | 0.054 |   |   |     |     |      |          |
| 1-Propyne                 | 48              | 9        | 0.050 | 0.056 | 0.071 | 0.093 | 0.122 | 0.196 | 0.050 | 0.080 | 0.036 |   |   |     |     |      |          |
| 1-Undecene                | 48              | 23       | 0.050 | 0.050 | 0.059 | 0.156 | 0.380 | 1.710 | 0.050 | 0.161 | 0.259 |   |   |     |     |      |          |
| 2,2,3-Trimethylbutane     | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |     |     |      |          |
| 2,2,4-Trimethylpentane    | 48              | 0        | 0.180 | 0.287 | 0.376 | 0.626 | 0.845 | 1.482 | 0.114 | 0.465 | 0.293 |   |   |     |     |      |          |
| 2,2,5-Trimethylhexane     | 48              | 44       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.095 | 0.050 | 0.052 | 0.008 |   |   |     |     |      |          |
| 2,2-Dimethylbutane        | 48              | 10       | 0.050 | 0.061 | 0.094 | 0.158 | 0.252 | 0.304 | 0.050 | 0.121 | 0.072 |   |   |     |     |      |          |
| 2,2-Dimethylhexane        | 48              | 42       | 0.050 | 0.050 | 0.050 | 0.050 | 0.053 | 0.108 | 0.050 | 0.052 | 0.010 |   |   |     |     |      |          |
| 2,2-Dimethylpentane       | 48              | 37       | 0.050 | 0.050 | 0.050 | 0.050 | 0.068 | 0.105 | 0.050 | 0.055 | 0.012 |   |   |     |     |      |          |

**Table 20: VOC Annual Statistics at Hamilton (2003)**

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds              | # of<br>Samples | No. < DL | 5%    | P     | E     | R     | C      | E      | N     | T     | I     | L     | E     | S      | 90%   | Max   | Min   | Mean | Std.Dev. |
|------------------------|-----------------|----------|-------|-------|-------|-------|--------|--------|-------|-------|-------|-------|-------|--------|-------|-------|-------|------|----------|
| 2,2-Dimethylpropane    | 48              | 38       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.083 | 0.115  | 0.050 | 0.056 | 0.014 |      |          |
| 2,3,4-Trimethylpentane | 48              | 2        | 0.077 | 0.096 | 0.130 | 0.221 | 0.268  | 0.325  | 0.439 | 0.517 | 0.517 | 0.517 | 0.268 | 0.517  | 0.050 | 0.161 | 0.097 |      |          |
| 2,3-Dimethylbutane     | 48              | 0        | 0.098 | 0.136 | 0.219 | 0.449 | 0.690  | 1.017  | 0.071 | 0.071 | 0.071 | 0.071 | 0.244 | 1.017  | 0.050 | 0.319 | 0.244 |      |          |
| 2,3-Dimethylpentane    | 48              | 0        | 0.090 | 0.137 | 0.178 | 0.278 | 0.405  | 0.632  | 0.059 | 0.059 | 0.059 | 0.059 | 0.130 | 0.632  | 0.050 | 0.223 | 0.130 |      |          |
| 2,4-Dimethylhexane     | 48              | 16       | 0.050 | 0.050 | 0.075 | 0.115 | 0.157  | 0.251  | 0.050 | 0.050 | 0.050 | 0.050 | 0.049 | 0.251  | 0.050 | 0.087 | 0.049 |      |          |
| 2,4-Dimethylpentane    | 48              | 3        | 0.050 | 0.071 | 0.099 | 0.170 | 0.237  | 0.368  | 0.050 | 0.050 | 0.050 | 0.050 | 0.075 | 0.368  | 0.050 | 0.126 | 0.075 |      |          |
| 2,5-Dimethylhexane     | 48              | 20       | 0.050 | 0.050 | 0.059 | 0.090 | 0.120  | 0.192  | 0.050 | 0.050 | 0.050 | 0.050 | 0.035 | 0.192  | 0.050 | 0.074 | 0.035 |      |          |
| 2-Ethyl-1-butene       | 48              | 48       |       |       |       |       |        |        |       |       |       |       |       |        |       |       |       |      |          |
| 2-Ethyltoluene         | 48              | 5        | 0.050 | 0.061 | 0.111 | 0.191 | 0.268  | 0.356  | 0.050 | 0.050 | 0.050 | 0.050 | 0.084 | 0.356  | 0.050 | 0.136 | 0.084 |      |          |
| 2-methyl-1-butene      | 48              | 2        | 0.052 | 0.081 | 0.102 | 0.212 | 0.325  | 0.439  | 0.050 | 0.050 | 0.050 | 0.050 | 0.102 | 0.439  | 0.050 | 0.149 | 0.102 |      |          |
| 2-Methyl-2-butene      | 48              | 1        | 0.051 | 0.073 | 0.146 | 0.318 | 0.524  | 0.672  | 0.050 | 0.050 | 0.050 | 0.050 | 0.173 | 0.672  | 0.050 | 0.212 | 0.173 |      |          |
| 2-Methylheptane        | 48              | 5        | 0.050 | 0.069 | 0.126 | 0.197 | 0.299  | 0.412  | 0.050 | 0.050 | 0.050 | 0.050 | 0.095 | 0.412  | 0.050 | 0.148 | 0.095 |      |          |
| 2-Methylhexane         | 48              | 0        | 0.189 | 0.240 | 0.388 | 0.626 | 0.834  | 1.127  | 0.129 | 0.129 | 0.129 | 0.129 | 0.279 | 1.127  | 0.129 | 0.463 | 0.279 |      |          |
| 2-Methylpentane        | 48              | 0        | 0.335 | 0.543 | 0.948 | 2.241 | 3.811  | 7.055  | 0.289 | 0.289 | 0.289 | 0.289 | 1.587 | 7.055  | 0.289 | 1.617 | 1.587 |      |          |
| 3,6-Dimethyloctane     | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.060  | 0.050 | 0.050 | 0.050 | 0.050 | 0.001 | 0.060  | 0.050 | 0.050 | 0.001 |      |          |
| 3-Ethyltoluene         | 48              | 1        | 0.098 | 0.139 | 0.266 | 0.456 | 0.666  | 0.929  | 0.050 | 0.050 | 0.050 | 0.050 | 0.213 | 0.929  | 0.050 | 0.323 | 0.213 |      |          |
| 3-Methyl-1-Butene      | 48              | 34       | 0.050 | 0.050 | 0.050 | 0.055 | 0.080  | 0.118  | 0.050 | 0.050 | 0.050 | 0.050 | 0.015 | 0.118  | 0.050 | 0.057 | 0.015 |      |          |
| 3-Methyl-1-pentene     | 48              | 48       |       |       |       |       |        |        |       |       |       |       |       |        |       |       |       |      |          |
| 3-Methylheptane        | 48              | 2        | 0.050 | 0.075 | 0.110 | 0.181 | 0.291  | 0.377  | 0.050 | 0.050 | 0.050 | 0.050 | 0.142 | 0.377  | 0.050 | 0.142 | 0.088 |      |          |
| 3-Methylhexane         | 48              | 0        | 0.157 | 0.235 | 0.376 | 0.628 | 1.000  | 1.250  | 0.131 | 0.131 | 0.131 | 0.131 | 0.497 | 1.250  | 0.131 | 0.497 | 0.326 |      |          |
| 3-Methylpentane        | 48              | 0        | 0.283 | 0.428 | 0.677 | 1.759 | 3.777  | 10.604 | 0.231 | 0.231 | 0.231 | 0.231 | 2.088 | 10.604 | 0.231 | 1.572 | 2.088 |      |          |
| 4-Ethyltoluene         | 48              | 4        | 0.050 | 0.067 | 0.136 | 0.234 | 0.337  | 0.472  | 0.050 | 0.050 | 0.050 | 0.050 | 0.162 | 0.472  | 0.050 | 0.162 | 0.108 |      |          |
| 4-Methyl-1-pentene     | 48              | 48       |       |       |       |       |        |        |       |       |       |       |       |        |       |       |       |      |          |
| 4-Methylheptane        | 48              | 26       | 0.050 | 0.050 | 0.050 | 0.078 | 0.125  | 0.146  | 0.050 | 0.050 | 0.050 | 0.050 | 0.068 | 0.146  | 0.050 | 0.068 | 0.029 |      |          |
| Acetylene              | 48              | 0        | 0.561 | 0.746 | 1.130 | 1.425 | 1.885  | 4.258  | 0.514 | 0.514 | 0.514 | 0.514 | 0.672 | 4.258  | 0.514 | 1.223 | 0.672 |      |          |
| a-Pinene               | 48              | 16       | 0.050 | 0.050 | 0.080 | 0.197 | 0.291  | 0.421  | 0.050 | 0.050 | 0.050 | 0.050 | 0.103 | 0.421  | 0.050 | 0.127 | 0.103 |      |          |
| Benzene                | 48              | 0        | 0.550 | 0.819 | 1.216 | 2.449 | 3.816  | 8.101  | 0.440 | 0.440 | 0.440 | 0.440 | 1.558 | 8.101  | 0.440 | 1.795 | 1.558 |      |          |
| Benzylchloride         | 48              | 48       |       |       |       |       |        |        |       |       |       |       |       |        |       |       |       |      |          |
| b-Pinene               | 48              | 36       | 0.050 | 0.050 | 0.050 | 0.053 | 0.078  | 0.109  | 0.050 | 0.050 | 0.050 | 0.050 | 0.014 | 0.109  | 0.050 | 0.056 | 0.014 |      |          |
| Bromodichloromethane   | 48              | 43       | 0.050 | 0.050 | 0.050 | 0.050 | 0.054  | 0.068  | 0.050 | 0.050 | 0.050 | 0.050 | 0.004 | 0.068  | 0.050 | 0.051 | 0.004 |      |          |
| Bromoform              | 48              | 48       |       |       |       |       |        |        |       |       |       |       |       |        |       |       |       |      |          |
| Bromomethane           | 48              | 0        | 0.051 | 0.058 | 0.066 | 0.083 | 0.096  | 0.116  | 0.050 | 0.050 | 0.050 | 0.050 | 0.017 | 0.116  | 0.050 | 0.071 | 0.017 |      |          |
| Butane                 | 48              | 0        | 1.411 | 2.340 | 3.910 | 7.393 | 14.053 | 19.891 | 1.198 | 1.198 | 1.198 | 1.198 | 4.799 | 19.891 | 1.198 | 5.497 | 4.799 |      |          |
| Camphene               | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.051  | 0.050 | 0.050 | 0.050 | 0.050 | 0.000 | 0.051  | 0.050 | 0.050 | 0.000 |      |          |
| Carbon tetrachloride   | 48              | 0        | 0.584 | 0.612 | 0.645 | 0.676 | 0.704  | 0.744  | 0.575 | 0.575 | 0.575 | 0.575 | 0.041 | 0.744  | 0.575 | 0.645 | 0.041 |      |          |
| Chlorobenzene          | 48              | 48       |       |       |       |       |        |        |       |       |       |       |       |        |       |       |       |      |          |
| Chloroethane           | 48              | 44       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.060  | 0.050 | 0.050 | 0.050 | 0.050 | 0.002 | 0.060  | 0.050 | 0.051 | 0.002 |      |          |



Table 20: VOC Annual Statistics at Hamilton (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                         | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | N<br>75% | I<br>90% | L<br>95% | S<br>Max | Min   | Mean  | Std.Dev. |
|-----------------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|----------|-------|-------|----------|
| Chloroform                        | 48              | 0        | 0.074   | 0.083    | 0.093    | 0.117    | 0.146    |          | 0.192    | 0.073 | 0.103 | 0.028    |
| Chloromethane                     | 48              | 0        | 1.045   | 1.105    | 1.235    | 1.596    | 1.803    |          | 1.868    | 1.012 | 1.327 | 0.280    |
| cis-1,2-Dichloroethylene          | 48              | 48       |         |          |          |          |          |          |          |       |       |          |
| cis-1,2-Dimethylcyclohexane       | 48              | 48       | 0.050   | 0.050    | 0.050    | 0.059    | 0.116    |          | 0.151    | 0.050 | 0.062 | 0.025    |
| cis-1,3-Dichloropropene           | 48              | 36       | 0.050   | 0.050    | 0.050    | 0.092    | 0.135    |          | 0.170    | 0.050 | 0.072 | 0.035    |
| cis-1,3-Dimethylcyclohexane       | 48              | 45       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.063    | 0.050 | 0.050 | 0.002    |
| cis-1,4-1,3,3-Dimethylcyclohexane | 48              | 4        | 0.050   | 0.065    | 0.082    | 0.182    | 0.299    |          | 0.424    | 0.050 | 0.132 | 0.098    |
| cis-2-Butene                      | 48              | 47       | 0.050   | 0.050    | 0.050    | 0.050    | 0.054    |          | 0.054    | 0.050 | 0.050 | 0.001    |
| cis-2-Heptene                     | 48              | 47       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          | 0.053    | 0.050 | 0.050 | 0.000    |
| cis-2-Hexene                      | 48              | 20       | 0.050   | 0.050    | 0.060    | 0.125    | 0.206    |          | 0.253    | 0.050 | 0.092 | 0.059    |
| cis-2-Pentene                     | 48              | 30       | 0.050   | 0.050    | 0.050    | 0.063    | 0.110    |          | 0.200    | 0.050 | 0.062 | 0.033    |
| cis-3-Heptene                     | 44              | 31       | 0.050   | 0.050    | 0.050    | 0.070    | 0.102    |          | 0.155    | 0.050 | 0.063 | 0.024    |
| cis-3-Methyl-2-pentene            | 48              | 41       | 0.050   | 0.050    | 0.050    | 0.050    | 0.056    |          | 0.073    | 0.050 | 0.052 | 0.005    |
| cis-4-Methyl-2-pentene            | 48              | 1        | 0.062   | 0.112    | 0.166    | 0.285    | 0.390    |          | 0.510    | 0.050 | 0.198 | 0.116    |
| Cyclohexane                       | 48              | 48       |         |          |          |          |          |          |          |       |       |          |
| Cyclohexene                       | 48              | 48       | 0.070   | 0.103    | 0.177    | 0.326    | 0.462    |          | 0.590    | 0.064 | 0.226 | 0.152    |
| Cyclopentane                      | 48              | 0        | 0.050   | 0.050    | 0.050    | 0.050    | 0.063    |          | 0.078    | 0.050 | 0.052 | 0.006    |
| Cyclopentene                      | 48              | 39       | 0.050   | 0.080    | 0.184    | 0.425    | 0.745    |          | 0.872    | 0.050 | 0.288 | 0.252    |
| Decane                            | 48              | 4        |         |          |          |          |          |          |          |       |       |          |
| Dibromochloromethane              | 48              | 48       |         |          |          |          |          |          |          |       |       |          |
| Dibromomethane                    | 48              | 48       | 0.222   | 0.279    | 0.362    | 0.577    | 0.809    |          | 1.415    | 0.180 | 0.459 | 0.292    |
| Dichloromethane                   | 48              | 0        | 0.050   | 0.050    | 0.059    | 0.110    | 0.190    |          | 0.297    | 0.050 | 0.092 | 0.061    |
| d-Limonene                        | 48              | 22       | 0.050   | 0.115    | 0.184    | 0.254    | 0.444    |          | 0.801    | 0.050 | 0.183 | 0.169    |
| Dodecane                          | 48              | 12       | 0.050   | 0.055    | 0.115    | 0.254    | 0.444    |          | 0.801    | 0.050 | 0.183 | 0.169    |
| EDB                               | 48              | 48       |         |          |          |          |          |          |          |       |       |          |
| Ethane                            | 48              | 0        | 2.249   | 2.984    | 3.998    | 4.601    | 7.113    |          | 11.052   | 2.048 | 4.312 | 2.059    |
| Ethylbenzene                      | 48              | 0        | 0.246   | 0.370    | 0.610    | 1.044    | 1.534    |          | 2.651    | 0.137 | 0.748 | 0.525    |
| Ethylbromide                      | 48              | 48       |         |          |          |          |          |          |          |       |       |          |
| Ethylene                          | 48              | 0        | 1.019   | 1.615    | 2.130    | 2.920    | 4.124    |          | 5.804    | 0.974 | 2.420 | 1.146    |
| Freon 1                           | 48              | 0        | 1.670   | 1.760    | 1.816    | 1.930    | 1.970    |          | 2.244    | 1.628 | 1.837 | 0.120    |
| Freon 13                          | 48              | 0        | 0.568   | 0.614    | 0.640    | 0.675    | 0.715    |          | 0.800    | 0.557 | 0.645 | 0.051    |
| Freon 14                          | 48              | 0        | 0.110   | 0.113    | 0.117    | 0.123    | 0.128    |          | 0.158    | 0.109 | 0.119 | 0.008    |
| Freon 12                          | 48              | 0        | 2.584   | 2.710    | 2.794    | 2.935    | 3.056    |          | 3.519    | 2.567 | 2.824 | 0.179    |
| Freon 22                          | 48              | 0        | 0.570   | 0.681    | 0.763    | 0.931    | 1.043    |          | 1.815    | 0.556 | 0.822 | 0.217    |
| Heptane                           | 48              | 0        | 0.108   | 0.147    | 0.292    | 0.535    | 0.889    |          | 1.027    | 0.083 | 0.371 | 0.267    |
| Hexachlorobutadiene               | 48              | 48       |         |          |          |          |          |          |          |       |       |          |
| Hexane                            | 48              | 0        | 0.278   | 0.598    | 1.635    | 3.132    | 10.339   |          | 90.396   | 0.248 | 4.982 | 13.782   |

Table 20: VOC Annual Statistics at Hamilton (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                     | # of Samples | No. < DL | 5%    | P     | E | R | C | E     | N | T     | I | L | E      | S | Max    | Min   | Mean  | Std.Dev. |
|-------------------------------|--------------|----------|-------|-------|---|---|---|-------|---|-------|---|---|--------|---|--------|-------|-------|----------|
| Hexylbenzene                  | 48           | 48       |       |       |   |   |   |       |   |       |   |   |        |   |        |       |       |          |
| Indane                        | 48           | 19       | 0.050 | 0.050 |   |   |   | 0.057 |   | 0.105 |   |   | 0.152  |   | 0.169  | 0.050 | 0.079 | 0.038    |
| Isobutane                     | 48           | 0        | 0.547 | 0.809 |   |   |   | 1.242 |   | 2.320 |   |   | 4.151  |   | 9.019  | 0.503 | 1.935 | 1.812    |
| iso-Butylbenzene              | 48           | 48       |       |       |   |   |   |       |   |       |   |   |        |   |        |       |       |          |
| Isopentane                    | 48           | 0        | 1.349 | 2.052 |   |   |   | 2.868 |   | 6.306 |   |   | 8.612  |   | 10.947 | 1.103 | 4.091 | 2.757    |
| Isoprene                      | 48           | 10       | 0.050 | 0.052 |   |   |   | 0.113 |   | 0.219 |   |   | 0.324  |   | 0.527  | 0.050 | 0.154 | 0.038    |
| iso-Propylbenzene             | 48           | 33       | 0.050 | 0.050 |   |   |   | 0.050 |   | 0.053 |   |   | 0.069  |   | 0.092  | 0.050 | 0.055 | 0.010    |
| m and p-Xylene                | 48           | 0        | 0.569 | 0.982 |   |   |   | 1.946 |   | 3.165 |   |   | 4.373  |   | 8.150  | 0.335 | 2.242 | 1.627    |
| Methylcyclohexane             | 48           | 4        | 0.050 | 0.073 |   |   |   | 0.143 |   | 0.258 |   |   | 0.413  |   | 0.533  | 0.050 | 0.179 | 0.133    |
| Methylcyclopentane            | 48           | 0        | 1.135 | 0.241 |   |   |   | 0.529 |   | 1.151 |   |   | 1.916  |   | 16.256 | 0.116 | 1.344 | 3.131    |
| MTBE                          | 48           | 44       | 0.050 | 0.050 |   |   |   | 0.050 |   | 0.050 |   |   | 0.050  |   | 0.164  | 0.050 | 0.057 | 0.024    |
| Naphthalene                   | 48           | 2        | 0.061 | 0.130 |   |   |   | 0.254 |   | 0.594 |   |   | 1.306  |   | 2.506  | 0.050 | 0.505 | 0.598    |
| n-Butylbenzene                | 48           | 38       | 0.050 | 0.050 |   |   |   | 0.050 |   | 0.050 |   |   | 0.061  |   | 0.079  | 0.050 | 0.053 | 0.007    |
| Nonane                        | 48           | 3        | 0.050 | 0.076 |   |   |   | 0.129 |   | 0.299 |   |   | 0.541  |   | 0.876  | 0.050 | 0.214 | 0.188    |
| n-Propylbenzene               | 48           | 8        | 0.050 | 0.058 |   |   |   | 0.098 |   | 0.168 |   |   | 0.233  |   | 0.324  | 0.050 | 0.120 | 0.072    |
| Octane                        | 48           | 3        | 0.050 | 0.082 |   |   |   | 0.137 |   | 0.266 |   |   | 0.367  |   | 0.440  | 0.050 | 0.173 | 0.115    |
| o-Xylene                      | 48           | 0        | 0.175 | 0.269 |   |   |   | 0.516 |   | 0.920 |   |   | 1.287  |   | 1.911  | 0.111 | 0.630 | 0.435    |
| p-Cymene                      | 48           | 43       | 0.050 | 0.050 |   |   |   | 0.050 |   | 0.050 |   |   | 0.051  |   | 0.083  | 0.050 | 0.051 | 0.005    |
| Pentane                       | 48           | 0        | 0.841 | 1.210 |   |   |   | 1.583 |   | 3.381 |   |   | 4.393  |   | 5.552  | 0.617 | 2.182 | 1.363    |
| Propane                       | 48           | 0        | 1.223 | 1.884 |   |   |   | 2.917 |   | 3.769 |   |   | 5.197  |   | 9.639  | 0.943 | 3.137 | 1.733    |
| Propylene                     | 48           | 0        | 0.330 | 0.491 |   |   |   | 0.659 |   | 1.040 |   |   | 1.355  |   | 2.391  | 0.276 | 0.811 | 0.466    |
| sec-Butylbenzene              | 48           | 48       |       |       |   |   |   |       |   |       |   |   |        |   |        |       |       |          |
| Styrene                       | 48           | 14       | 0.050 | 0.050 |   |   |   | 0.099 |   | 0.146 |   |   | 0.209  |   | 0.365  | 0.050 | 0.116 | 0.076    |
| tert-Butylbenzene             | 48           | 48       |       |       |   |   |   |       |   |       |   |   |        |   |        |       |       |          |
| Tetrachloroethylene           | 48           | 0        | 0.083 | 0.106 |   |   |   | 0.272 |   | 0.648 |   |   | 0.929  |   | 2.143  | 0.064 | 0.402 | 0.416    |
| Toluene                       | 48           | 0        | 1.241 | 2.029 |   |   |   | 3.605 |   | 7.302 |   |   | 11.941 |   | 24.014 | 0.800 | 5.163 | 4.554    |
| trans-1,2-Dichloroethylene    | 48           | 48       |       |       |   |   |   |       |   |       |   |   |        |   |        |       |       |          |
| trans-1,2-Dimethylcyclohexane | 48           | 47       | 0.050 | 0.050 |   |   |   | 0.050 |   | 0.050 |   |   | 0.050  |   | 0.547  | 0.050 | 0.060 | 0.072    |
| trans-1,3-Dichloropropene     | 48           | 39       | 0.050 | 0.050 |   |   |   | 0.050 |   | 0.050 |   |   | 0.074  |   | 0.111  | 0.050 | 0.055 | 0.013    |
| trans-1,4-Dimethylcyclohexane | 48           | 41       | 0.050 | 0.050 |   |   |   | 0.050 |   | 0.050 |   |   | 0.050  |   | 0.073  | 0.050 | 0.052 | 0.004    |
| trans-2-Butene                | 48           | 1        | 0.052 | 0.067 |   |   |   | 0.094 |   | 0.268 |   |   | 0.393  |   | 0.578  | 0.050 | 0.165 | 0.135    |
| trans-2-Heptene               | 48           | 48       |       |       |   |   |   |       |   |       |   |   |        |   |        |       |       |          |
| trans-2-Hexene                | 48           | 35       | 0.050 | 0.050 |   |   |   | 0.050 |   | 0.054 |   |   | 0.086  |   | 0.110  | 0.050 | 0.057 | 0.015    |
| trans-2-Octene                | 48           | 31       | 0.050 | 0.050 |   |   |   | 0.050 |   | 0.069 |   |   | 0.104  |   | 0.140  | 0.050 | 0.063 | 0.024    |
| trans-2-Pentene               | 48           | 6        | 0.050 | 0.071 |   |   |   | 0.119 |   | 0.245 |   |   | 0.412  |   | 0.585  | 0.050 | 0.176 | 0.140    |
| trans-3-Heptene               | 48           | 48       |       |       |   |   |   |       |   |       |   |   |        |   |        |       |       |          |
| trans-3-Methyl-2-pentene      | 48           | 47       | 0.050 | 0.050 |   |   |   | 0.050 |   | 0.050 |   |   | 0.050  |   | 0.057  | 0.050 | 0.050 | 0.001    |

**Table 20: VOC Annual Statistics at Hamilton (2003)**

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                | # of<br>Samples | No. < DL | P E R C E N T I L E S |       |       |       |       | Max   | Min   | Mean  | Std.Dev. |
|--------------------------|-----------------|----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|----------|
|                          |                 |          | 5%                    | 25%   | 50%   | 75%   | 90%   |       |       |       |          |
| trans-4-Methyl-2-pentene | 48              | 47       | 0.050                 | 0.050 | 0.050 | 0.050 | 0.050 | 0.096 | 0.050 | 0.051 | 0.007    |
| Trichloroethylene        | 48              | 22       | 0.050                 | 0.050 | 0.055 | 0.089 | 0.152 | 0.279 | 0.050 | 0.081 | 0.054    |
| Undecane                 | 48              | 4        | 0.050                 | 0.120 | 0.210 | 0.452 | 0.709 | 0.903 | 0.050 | 0.299 | 0.246    |
| Vinylchloride            | 48              | 48       |                       |       |       |       |       |       |       |       |          |

**Table 21: VOC Annual Statistics at Longwoods (2003)**

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds              | # of Samples | No. < DL | 5%    | P     | E     | R     | C     | E     | N     | T     | I     | L | E | S | Max | Min | Mean | Std.Dev. |
|------------------------|--------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|---|---|-----|-----|------|----------|
| 1,1,1-Trichloroethane  | 84           | 0        | 0.149 | 0.155 | 0.158 | 0.170 | 0.176 | 0.189 | 0.143 | 0.161 | 0.010 |   |   |   |     |     |      |          |
| 1,1,2-Trichloroethane  | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 1,2,3-Trimethylbenzene | 84           | 82       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.079 | 0.050 | 0.050 | 0.003 |   |   |   |     |     |      |          |
| 1,2,4-Trimethylbenzene | 84           | 58       | 0.050 | 0.050 | 0.050 | 0.060 | 0.084 | 0.295 | 0.050 | 0.061 | 0.031 |   |   |   |     |     |      |          |
| 1,2-Dichloroethane     | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 1,3,5-Trimethylbenzene | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 1,3-Butadiene          | 84           | 83       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.065 | 0.050 | 0.050 | 0.002 |   |   |   |     |     |      |          |
| 1,3-Diethylbenzene     | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 1,4-Dichlorobenzene    | 84           | 83       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.069 | 0.050 | 0.050 | 0.002 |   |   |   |     |     |      |          |
| 1,4-Diethylbenzene     | 65           | 65       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 1-Butene/Isobutene     | 84           | 0        | 0.064 | 0.087 | 0.099 | 0.138 | 0.173 | 0.217 | 0.052 | 0.113 | 0.038 |   |   |   |     |     |      |          |
| 1-Butyne               | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 1-Hexene               | 84           | 80       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.111 | 0.050 | 0.052 | 0.009 |   |   |   |     |     |      |          |
| 1-Pentene              | 84           | 79       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.394 | 0.050 | 0.056 | 0.039 |   |   |   |     |     |      |          |
| 1-Propyne              | 84           | 83       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.052 | 0.050 | 0.050 | 0.000 |   |   |   |     |     |      |          |
| 2,2,4-Trimethylpentane | 84           | 29       | 0.050 | 0.050 | 0.062 | 0.092 | 0.122 | 0.251 | 0.050 | 0.078 | 0.039 |   |   |   |     |     |      |          |
| 2,2,5-Trimethylhexane  | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 2,2-Dimethylbutane     | 84           | 77       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.086 | 0.050 | 0.051 | 0.005 |   |   |   |     |     |      |          |
| 2,2-Dimethylhexane     | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 2,2-Dimethylpentane    | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 2,2,4-Dimethylpropane  | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 2,3,4-Trimethylpentane | 84           | 79       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.074 | 0.050 | 0.051 | 0.003 |   |   |   |     |     |      |          |
| 2,3-Dimethylbutane     | 84           | 73       | 0.050 | 0.050 | 0.050 | 0.050 | 0.052 | 0.090 | 0.050 | 0.052 | 0.008 |   |   |   |     |     |      |          |
| 2,3-Dimethylpentane    | 84           | 70       | 0.050 | 0.050 | 0.050 | 0.050 | 0.061 | 0.173 | 0.050 | 0.055 | 0.017 |   |   |   |     |     |      |          |
| 2,4-Dimethylhexane     | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 2,4-Dimethylpentane    | 84           | 81       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.055 | 0.050 | 0.050 | 0.001 |   |   |   |     |     |      |          |
| 2,5-Dimethylhexane     | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 2-Ethyltoluene         | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 2-methyl-1-butene      | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 2-Methyl-2-butene      | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 2-Methylheptane        | 84           | 80       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.070 | 0.050 | 0.050 | 0.002 |   |   |   |     |     |      |          |
| 2-Methylhexane         | 84           | 38       | 0.050 | 0.050 | 0.056 | 0.090 | 0.113 | 0.232 | 0.050 | 0.072 | 0.036 |   |   |   |     |     |      |          |
| 2-Methylpentane        | 84           | 4        | 0.052 | 0.076 | 0.117 | 0.175 | 0.222 | 0.381 | 0.050 | 0.137 | 0.079 |   |   |   |     |     |      |          |
| 3-Ethyltoluene         | 84           | 70       | 0.050 | 0.050 | 0.050 | 0.050 | 0.061 | 0.100 | 0.050 | 0.053 | 0.008 |   |   |   |     |     |      |          |
| 3-Methyl-1-pentene     | 84           | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| 3-Methylheptane        | 81           | 78       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.087 | 0.050 | 0.051 | 0.005 |   |   |   |     |     |      |          |
| 3-Methylhexane         | 84           | 35       | 0.050 | 0.050 | 0.058 | 0.090 | 0.123 | 0.236 | 0.050 | 0.074 | 0.038 |   |   |   |     |     |      |          |

Table 21: VOC Annual Statistics at Longwoods (2003)

Unit: micrograms per cubic metre (µg/m³)

| Compounds                       | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | C<br>75% | N<br>90% | L<br>90% | E<br>S | Max   | Min   | Mean  | Std.Dev. |
|---------------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|--------|-------|-------|-------|----------|
| 3-Methylpentane                 | 84              | 11       | 0.050   | 0.066    | 0.097    | 0.149    | 0.189    |          |        | 0.338 | 0.050 | 0.115 | 0.065    |
| 4-Ethyltoluene                  | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| 4-Methyl-1-pentene              | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| 4-Methylheptane                 | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| Acetylene                       | 84              | 0        | 0.178   | 0.269    | 0.410    | 0.649    | 0.864    |          |        | 1.139 | 0.121 | 0.471 | 0.259    |
| a-Pitene                        | 62              | 19       | 0.050   | 0.050    | 0.103    | 0.338    | 0.694    |          |        | 1.889 | 0.050 | 0.294 | 0.406    |
| Benzene                         | 84              | 0        | 0.185   | 0.283    | 0.357    | 0.552    | 0.755    |          |        | 0.946 | 0.108 | 0.434 | 0.207    |
| b-Pitene                        | 56              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.093    |          |        | 0.129 | 0.050 | 0.058 | 0.020    |
| Bromoforn                       | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| Bromomethane                    | 84              | 11       | 0.050   | 0.055    | 0.060    | 0.066    | 0.071    |          |        | 0.094 | 0.050 | 0.061 | 0.009    |
| Butane                          | 84              | 0        | 0.341   | 0.639    | 0.904    | 1.565    | 2.249    |          |        | 5.049 | 0.200 | 1.201 | 0.855    |
| Camphene                        | 84              | 40       | 0.050   | 0.062    | 0.193    | 0.364    | 0.688    |          |        | 0.958 | 0.050 | 0.152 | 0.183    |
| Carbon tetrachloride            | 84              | 0        | 0.507   | 0.564    | 0.622    | 0.646    | 0.688    |          |        | 0.741 | 0.474 | 0.612 | 0.060    |
| Chlorobenzene                   | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| Chloroethane                    | 84              | 82       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          |        | 0.135 | 0.050 | 0.051 | 0.009    |
| Chloroforn                      | 84              | 0        | 0.060   | 0.066    | 0.072    | 0.078    | 0.086    |          |        | 0.105 | 0.057 | 0.073 | 0.009    |
| Chloromethane                   | 84              | 0        | 1.064   | 1.124    | 1.169    | 1.262    | 1.337    |          |        | 1.455 | 1.021 | 1.193 | 0.097    |
| cis-1,2-Dimethylcyclohexane     | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| cis-1,3-Dimethylcyclohexane     | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| cis-1,4-1,3-Dimethylcyclohexane | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| cis-2-Butene                    | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| cis-2-Hexene                    | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| cis-2-Pentene                   | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| cis-3-Methyl-2-pentene          | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| cis-4-Methyl-2-pentene          | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| Cyclohexane                     | 84              | 60       | 0.050   | 0.050    | 0.050    | 0.053    | 0.091    |          |        | 0.297 | 0.050 | 0.062 | 0.035    |
| Cyclopentane                    | 84              | 75       | 0.050   | 0.050    | 0.050    | 0.050    | 0.052    |          |        | 0.074 | 0.050 | 0.052 | 0.005    |
| Cyclopentene                    | 84              | 84       |         |          |          |          |          |          |        |       |       |       |          |
| Decane                          | 84              | 62       | 0.050   | 0.050    | 0.050    | 0.052    | 0.081    |          |        | 0.395 | 0.050 | 0.062 | 0.042    |
| Dichloromethane                 | 84              | 0        | 0.143   | 0.164    | 0.192    | 0.230    | 0.282    |          |        | 0.478 | 0.118 | 0.205 | 0.061    |
| d-Limonene                      | 84              | 37       | 0.050   | 0.050    | 0.068    | 0.161    | 0.315    |          |        | 0.839 | 0.050 | 0.136 | 0.157    |
| Dodecane                        | 84              | 32       | 0.050   | 0.050    | 0.057    | 0.074    | 0.107    |          |        | 0.469 | 0.050 | 0.076 | 0.057    |
| Ethane                          | 84              | 0        | 1.342   | 1.748    | 2.190    | 3.087    | 4.424    |          |        | 7.104 | 1.085 | 2.627 | 1.305    |
| Ethylbenzene                    | 84              | 17       | 0.050   | 0.055    | 0.076    | 0.111    | 0.168    |          |        | 0.234 | 0.050 | 0.092 | 0.049    |
| Ethylene                        | 84              | 0        | 0.172   | 0.247    | 0.446    | 0.793    | 1.060    |          |        | 2.069 | 0.125 | 0.563 | 0.404    |
| Freon 11                        | 84              | 0        | 1.476   | 1.623    | 1.752    | 1.872    | 2.027    |          |        | 2.331 | 1.434 | 1.762 | 0.208    |
| Freon 13                        | 84              | 0        | 0.541   | 0.576    | 0.637    | 0.656    | 0.669    |          |        | 0.691 | 0.536 | 0.621 | 0.047    |

Table 21: VOC Annual Statistics at Longwoods (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                     | # of<br>Samples | No. < DL | 5%    | P     | E     | R     | C     | E     | N     | T     | I     | L | E | S | Max | Min | Mean | Std.Dev. |
|-------------------------------|-----------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|---|---|-----|-----|------|----------|
| Freon114                      | 84              | 0        | 0.101 | 0.105 | 0.116 | 0.122 | 0.129 | 0.141 | 0.099 | 0.115 | 0.010 |   |   |   |     |     |      |          |
| Freon12                       | 84              | 0        | 2.439 | 2.681 | 2.950 | 3.391 | 4.251 | 5.056 | 2.318 | 3.165 | 0.655 |   |   |   |     |     |      |          |
| Freon22                       | 84              | 0        | 0.466 | 0.521 | 0.568 | 0.626 | 0.678 | 0.785 | 0.450 | 0.575 | 0.076 |   |   |   |     |     |      |          |
| Heptane                       | 84              | 41       | 0.050 | 0.050 | 0.051 | 0.080 | 0.106 | 0.201 | 0.050 | 0.069 | 0.040 |   |   |   |     |     |      |          |
| Hexane                        | 84              | 3        | 0.054 | 0.079 | 0.121 | 0.184 | 0.274 | 0.425 | 0.050 | 0.144 | 0.087 |   |   |   |     |     |      |          |
| Indane                        | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| Isobutane                     | 84              | 0        | 0.091 | 0.212 | 0.332 | 0.607 | 0.861 | 1.596 | 0.058 | 0.449 | 0.334 |   |   |   |     |     |      |          |
| iso-Butylbenzene              | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| Isopentane                    | 84              | 0        | 0.242 | 0.365 | 0.520 | 0.775 | 1.066 | 2.244 | 0.217 | 0.618 | 0.381 |   |   |   |     |     |      |          |
| Isoprene                      | 84              | 44       | 0.050 | 0.050 | 0.050 | 0.866 | 1.708 | 3.744 | 0.050 | 0.530 | 0.828 |   |   |   |     |     |      |          |
| iso-Propylbenzene             | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| m and p-Xylene                | 84              | 8        | 0.050 | 0.080 | 0.115 | 0.168 | 0.290 | 0.481 | 0.050 | 0.137 | 0.100 |   |   |   |     |     |      |          |
| Methylcyclohexane             | 84              | 73       | 0.050 | 0.050 | 0.050 | 0.050 | 0.054 | 0.100 | 0.050 | 0.052 | 0.008 |   |   |   |     |     |      |          |
| Methylcyclopentane            | 84              | 50       | 0.050 | 0.050 | 0.050 | 0.070 | 0.098 | 0.159 | 0.050 | 0.064 | 0.026 |   |   |   |     |     |      |          |
| Naphthalene                   | 84              | 57       | 0.050 | 0.050 | 0.050 | 0.059 | 0.066 | 0.119 | 0.050 | 0.056 | 0.012 |   |   |   |     |     |      |          |
| n-Butylbenzene                | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| Nonane                        | 84              | 75       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.166 | 0.050 | 0.053 | 0.014 |   |   |   |     |     |      |          |
| n-Propylbenzene               | 84              | 83       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.051 | 0.050 | 0.050 | 0.000 |   |   |   |     |     |      |          |
| Oetane                        | 84              | 67       | 0.050 | 0.050 | 0.050 | 0.050 | 0.062 | 0.122 | 0.050 | 0.054 | 0.012 |   |   |   |     |     |      |          |
| o-Xylene                      | 84              | 44       | 0.050 | 0.050 | 0.050 | 0.070 | 0.117 | 0.160 | 0.050 | 0.068 | 0.030 |   |   |   |     |     |      |          |
| p-Cymene                      | 84              | 66       | 0.050 | 0.050 | 0.050 | 0.050 | 0.132 | 0.276 | 0.050 | 0.066 | 0.043 |   |   |   |     |     |      |          |
| Pentane                       | 84              | 0        | 0.170 | 0.232 | 0.342 | 0.452 | 0.619 | 1.157 | 0.143 | 0.374 | 0.198 |   |   |   |     |     |      |          |
| Propane                       | 84              | 0        | 0.418 | 1.013 | 1.484 | 2.342 | 3.320 | 8.464 | 0.241 | 1.877 | 1.416 |   |   |   |     |     |      |          |
| Propylene                     | 84              | 3        | 0.057 | 0.085 | 0.123 | 0.184 | 0.295 | 0.522 | 0.050 | 0.148 | 0.089 |   |   |   |     |     |      |          |
| sec-Butylbenzene              | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| Styrene                       | 84              | 78       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.074 | 0.050 | 0.051 | 0.005 |   |   |   |     |     |      |          |
| Tetrachloroethylene           | 84              | 25       | 0.050 | 0.050 | 0.065 | 0.097 | 0.145 | 0.201 | 0.050 | 0.082 | 0.040 |   |   |   |     |     |      |          |
| Toluene                       | 84              | 0        | 0.212 | 0.342 | 0.481 | 0.684 | 1.048 | 1.603 | 0.143 | 0.562 | 0.311 |   |   |   |     |     |      |          |
| trans-1,2-Dimethylcyclohexane | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| trans-1,4-Dimethylcyclohexane | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| trans-2-Butene                | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| trans-2-Hexene                | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| trans-2-Pentene               | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| trans-3-Methyl-2-pentene      | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |
| Trichloroethylene             | 84              | 74       | 0.050 | 0.050 | 0.050 | 0.050 | 0.053 | 0.161 | 0.050 | 0.053 | 0.013 |   |   |   |     |     |      |          |
| Undecane                      | 84              | 19       | 0.050 | 0.053 | 0.075 | 0.113 | 0.198 | 1.206 | 0.050 | 0.110 | 0.139 |   |   |   |     |     |      |          |
| Vinylchloride                 | 84              | 84       |       |       |       |       |       |       |       |       |       |   |   |   |     |     |      |          |

Table 22: VOC Annual Statistics at Ottawa (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                 | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | C<br>75% | N<br>90% | I<br>95% | L<br>99% | S     | Max   | Min | Mean | Std.Dev. |
|---------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|----------|-------|-------|-----|------|----------|
| 1,1,1-Trichloroethane     | 49              | 0        | 0.150   | 0.161    | 0.166    | 0.180    | 0.204    | 0.257    | 0.146    | 0.173 | 0.021 |     |      |          |
| 1,1,2,2-Tetrachloroethane | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,1,2-Trichloroethane     | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,1-Dichloroethane        | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,1-Dichloroethylene      | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,2,3-Trimethylbenzene    | 49              | 6        | 0.050   | 0.066    | 0.101    | 0.118    | 0.151    | 0.191    | 0.050    | 0.100 | 0.038 |     |      |          |
| 1,2,4-Trichlorobenzene    | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,2,4-Trimethylbenzene    | 49              | 0        | 0.106   | 0.311    | 0.431    | 0.558    | 0.668    | 1.087    | 0.062    | 0.438 | 0.199 |     |      |          |
| 1,2-Dichlorobenzene       | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,2-Dichloroethane        | 49              | 45       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.060    | 0.050    | 0.050 | 0.002 |     |      |          |
| 1,2-Dichloropropane       | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,2-Diethylbenzene        | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,3,5-Trimethylbenzene    | 49              | 4        | 0.050   | 0.095    | 0.127    | 0.167    | 0.191    | 0.307    | 0.050    | 0.131 | 0.054 |     |      |          |
| 1,3-Butadiene             | 49              | 6        | 0.050   | 0.075    | 0.099    | 0.135    | 0.219    | 0.359    | 0.050    | 0.116 | 0.062 |     |      |          |
| 1,3-Dichlorobenzene       | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,3-Diethylbenzene        | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,4-Dichlorobenzene       | 49              | 5        | 0.050   | 0.068    | 0.104    | 0.133    | 0.189    | 0.220    | 0.050    | 0.109 | 0.048 |     |      |          |
| 1,4-Dichlorobutane        | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1,4-Diethylbenzene        | 49              | 14       | 0.050   | 0.050    | 0.070    | 0.083    | 0.105    | 0.137    | 0.050    | 0.073 | 0.023 |     |      |          |
| 1-Butene/Isobutene        | 49              | 0        | 0.196   | 0.367    | 0.476    | 0.657    | 0.939    | 2.457    | 0.153    | 0.578 | 0.375 |     |      |          |
| 1-Butyne                  | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 1-Decene                  | 49              | 49       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.076    | 0.050    | 0.051 | 0.004 |     |      |          |
| 1-Heptene                 | 49              | 48       | 0.050   | 0.058    | 0.069    | 0.087    | 0.094    | 0.192    | 0.050    | 0.073 | 0.025 |     |      |          |
| 1-Hexene                  | 49              | 9        | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.103    | 0.050    | 0.051 | 0.008 |     |      |          |
| 1-Methylcyclohexene       | 49              | 49       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.142    | 0.050    | 0.052 | 0.013 |     |      |          |
| 1-Methylcyclopentene      | 49              | 46       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.246    | 0.050    | 0.102 | 0.041 |     |      |          |
| 1-Nonene                  | 49              | 47       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.229    | 0.050    | 0.075 | 0.037 |     |      |          |
| 1-Octene                  | 49              | 49       | 0.050   | 0.076    | 0.100    | 0.113    | 0.153    | 0.246    | 0.050    | 0.102 | 0.041 |     |      |          |
| 1-Pentene                 | 49              | 3        | 0.050   | 0.050    | 0.060    | 0.082    | 0.138    | 0.229    | 0.050    | 0.075 | 0.037 |     |      |          |
| 1-Propyne                 | 49              | 17       | 0.050   | 0.050    | 0.050    | 0.114    | 0.198    | 0.717    | 0.050    | 0.098 | 0.108 |     |      |          |
| 1-Undecene                | 49              | 29       | 0.050   | 0.050    | 0.050    | 0.300    | 0.415    | 0.827    | 0.056    | 0.254 | 0.132 |     |      |          |
| 2,2,3-Trimethylbutane     | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 2,2,4-Trimethylpentane    | 49              | 0        | 0.062   | 0.175    | 0.236    | 0.300    | 0.415    | 0.827    | 0.056    | 0.254 | 0.132 |     |      |          |
| 2,2,5-Trimethylhexane     | 49              | 48       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.052    | 0.050    | 0.050 | 0.000 |     |      |          |
| 2,2-Dimethylbutane        | 49              | 2        | 0.056   | 0.137    | 0.169    | 0.209    | 0.256    | 0.599    | 0.050    | 0.176 | 0.087 |     |      |          |
| 2,2-Dimethylhexane        | 49              | 49       |         |          |          |          |          |          |          |       |       |     |      |          |
| 2,2-Dimethylpentane       | 49              | 48       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.064    | 0.050    | 0.050 | 0.002 |     |      |          |



Table 22: VOC Annual Statistics at Ottawa (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds              | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | C<br>75% | N<br>90% | E<br>95% | S<br>99% | Max   | Min   | Mean | Std.Dev. |
|------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|----------|-------|-------|------|----------|
| 2,2-Dimethylpropane    | 49              | 49       |         |          |          |          |          |          |          |       |       |      |          |
| 2,3,4-Trimethylpentane | 49              | 6        | 0.050   | 0.062    | 0.089    | 0.113    | 0.130    | 0.263    | 0.050    | 0.094 | 0.042 |      |          |
| 2,3,4-Dimethylbutane   | 49              | 0        | 0.066   | 0.151    | 0.233    | 0.270    | 0.320    | 0.739    | 0.052    | 0.225 | 0.110 |      |          |
| 2,3-Dimethylpentane    | 49              | 2        | 0.055   | 0.098    | 0.135    | 0.183    | 0.244    | 0.382    | 0.050    | 0.136 | 0.066 |      |          |
| 2,4-Dimethylhexane     | 49              | 18       | 0.050   | 0.050    | 0.055    | 0.069    | 0.085    | 0.162    | 0.050    | 0.064 | 0.022 |      |          |
| 2,4-Dimethylpentane    | 49              | 9        | 0.050   | 0.062    | 0.086    | 0.108    | 0.132    | 0.236    | 0.050    | 0.089 | 0.035 |      |          |
| 2,5-Dimethylhexane     | 49              | 27       | 0.050   | 0.050    | 0.050    | 0.062    | 0.082    | 0.129    | 0.050    | 0.059 | 0.016 |      |          |
| 2-Ethyl-1-butene       | 49              | 49       |         |          |          |          |          |          |          |       |       |      |          |
| 2-Ethyltoluene         | 49              | 6        | 0.050   | 0.078    | 0.106    | 0.135    | 0.149    | 0.234    | 0.050    | 0.108 | 0.041 |      |          |
| 2-methyl-1-butene      | 49              | 3        | 0.050   | 0.111    | 0.144    | 0.179    | 0.205    | 0.440    | 0.050    | 0.152 | 0.075 |      |          |
| 2-Methyl-2-butene      | 49              | 3        | 0.050   | 0.126    | 0.155    | 0.219    | 0.305    | 0.865    | 0.050    | 0.186 | 0.124 |      |          |
| 2-Methylheptane        | 49              | 5        | 0.050   | 0.080    | 0.105    | 0.141    | 0.190    | 0.310    | 0.050    | 0.117 | 0.058 |      |          |
| 2-Methylhexane         | 49              | 0        | 0.125   | 0.248    | 0.347    | 0.442    | 0.554    | 1.002    | 0.072    | 0.356 | 0.168 |      |          |
| 2-Methylpentane        | 49              | 0        | 0.257   | 0.626    | 0.894    | 1.082    | 1.370    | 3.084    | 0.175    | 0.907 | 0.471 |      |          |
| 3,6-Dimethyloctane     | 49              | 47       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.087    | 0.050    | 0.051 | 0.006 |      |          |
| 3-Ethyltoluene         | 49              | 1        | 0.074   | 0.193    | 0.248    | 0.309    | 0.370    | 0.639    | 0.050    | 0.256 | 0.114 |      |          |
| 3-Methyl-1-butene      | 49              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.062    | 0.139    | 0.050    | 0.055 | 0.015 |      |          |
| 3-Methyl-1-pentene     | 49              | 49       |         |          |          |          |          |          |          |       |       |      |          |
| 3-Methylheptane        | 49              | 5        | 0.050   | 0.086    | 0.105    | 0.145    | 0.197    | 0.306    | 0.050    | 0.119 | 0.056 |      |          |
| 3-Methylhexane         | 49              | 2        | 0.070   | 0.262    | 0.355    | 0.347    | 0.623    | 1.055    | 0.050    | 0.365 | 0.182 |      |          |
| 3-Methylpentane        | 49              | 0        | 0.224   | 0.454    | 0.627    | 0.807    | 1.010    | 2.064    | 0.138    | 0.658 | 0.319 |      |          |
| 4-Ethyltoluene         | 49              | 5        | 0.050   | 0.096    | 0.130    | 0.160    | 0.185    | 0.316    | 0.050    | 0.130 | 0.055 |      |          |
| 4-Methyl-1-pentene     | 49              | 49       |         |          |          |          |          |          |          |       |       |      |          |
| 4-Methylheptane        | 49              | 32       | 0.050   | 0.050    | 0.050    | 0.056    | 0.072    | 0.126    | 0.050    | 0.057 | 0.014 |      |          |
| Acetylene              | 49              | 0        | 0.454   | 0.588    | 0.788    | 1.358    | 2.240    | 3.616    | 0.305    | 1.039 | 0.724 |      |          |
| a-Phene                | 49              | 3        | 0.050   | 0.154    | 0.312    | 0.467    | 0.811    | 1.110    | 0.050    | 0.372 | 0.279 |      |          |
| Benzene                | 49              | 0        | 0.419   | 0.648    | 0.906    | 1.161    | 1.871    | 3.655    | 0.298    | 1.019 | 0.582 |      |          |
| Benzylchloride         | 49              | 49       |         |          |          |          |          |          |          |       |       |      |          |
| b-Phene                | 49              | 19       | 0.050   | 0.050    | 0.079    | 0.164    | 0.267    | 0.504    | 0.050    | 0.119 | 0.096 |      |          |
| Bromodichloromethane   | 49              | 49       |         |          |          |          |          |          |          |       |       |      |          |
| Bromoform              | 49              | 49       |         |          |          |          |          |          |          |       |       |      |          |
| Bromomethane           | 49              | 5        | 0.050   | 0.056    | 0.064    | 0.073    | 0.086    | 0.126    | 0.050    | 0.067 | 0.015 |      |          |
| Butane                 | 49              | 0        | 0.761   | 1.659    | 2.439    | 3.976    | 6.616    | 13.588   | 0.490    | 3.160 | 2.365 |      |          |
| Camphene               | 49              | 19       | 0.050   | 0.050    | 0.057    | 0.092    | 0.123    | 0.175    | 0.050    | 0.074 | 0.034 |      |          |
| Carbon tetrachloride   | 49              | 0        | 0.553   | 0.601    | 0.628    | 0.685    | 0.716    | 0.774    | 0.525    | 0.641 | 0.058 |      |          |
| Chlorobenzene          | 49              | 49       |         |          |          |          |          |          |          |       |       |      |          |
| Chloroethane           | 49              | 48       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.055    | 0.050    | 0.050 | 0.001 |      |          |

Table 22: VOC Annual Statistics at Ottawa (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                         | # of Samples | No. < DL | 5%    | P     | E     | R     | C     | E     | N     | T     | I     | L | E | S | Max   | Min   | Mean  | Std.Dev. |
|-----------------------------------|--------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|---|---|-------|-------|-------|----------|
| Chloroform                        | 49           | 0        | 0.088 | 0.115 | 0.148 | 0.192 | 0.228 | 0.321 | 0.081 | 0.157 | 0.054 |   |   |   | 0.321 | 0.081 | 0.157 | 0.054    |
| Chloromethane                     | 49           | 0        | 1.011 | 1.107 | 1.253 | 1.479 | 1.580 | 1.672 | 0.946 | 1.280 | 0.211 |   |   |   | 1.672 | 0.946 | 1.280 | 0.211    |
| cis-1,2-Dichloroethylene          | 49           | 49       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| cis-1,2-Dimethylcyclohexane       | 49           | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.058 | 0.050 | 0.050 | 0.001 |   |   |   | 0.058 | 0.050 | 0.050 | 0.001    |
| cis-1,3-Dichloropropene           | 49           | 49       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| cis-1,3-Dimethylcyclohexane       | 49           | 32       | 0.050 | 0.050 | 0.050 | 0.055 | 0.078 | 0.346 | 0.050 | 0.062 | 0.044 |   |   |   | 0.346 | 0.050 | 0.062 | 0.044    |
| cis-1,4-t-1,3-Dimethylcyclohexane | 49           | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.117 | 0.050 | 0.051 | 0.010 |   |   |   | 0.117 | 0.050 | 0.051 | 0.010    |
| cis-2-Butene                      | 49           | 2        | 0.051 | 0.105 | 0.156 | 0.209 | 0.270 | 0.702 | 0.050 | 0.175 | 0.111 |   |   |   | 0.702 | 0.050 | 0.175 | 0.111    |
| cis-2-Heptene                     | 49           | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.055 | 0.050 | 0.052 | 0.014 |   |   |   | 0.151 | 0.050 | 0.052 | 0.014    |
| cis-2-Hexene                      | 49           | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.055 | 0.050 | 0.050 | 0.001 |   |   |   | 0.055 | 0.050 | 0.050 | 0.001    |
| cis-2-Pentene                     | 49           | 6        | 0.050 | 0.060 | 0.081 | 0.103 | 0.117 | 0.270 | 0.050 | 0.086 | 0.037 |   |   |   | 0.270 | 0.050 | 0.086 | 0.037    |
| cis-3-Heptene                     | 44           | 23       | 0.050 | 0.050 | 0.050 | 0.063 | 0.085 | 0.120 | 0.050 | 0.061 | 0.018 |   |   |   | 0.120 | 0.050 | 0.061 | 0.018    |
| cis-3-Methyl-2-pentene            | 49           | 34       | 0.050 | 0.050 | 0.050 | 0.057 | 0.142 | 0.175 | 0.050 | 0.066 | 0.034 |   |   |   | 0.175 | 0.050 | 0.066 | 0.034    |
| cis-4-Methyl-2-pentene            | 49           | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.085 | 0.050 | 0.051 | 0.005 |   |   |   | 0.085 | 0.050 | 0.051 | 0.005    |
| Cyclohexane                       | 49           | 4        | 0.050 | 0.093 | 0.128 | 0.169 | 0.240 | 0.482 | 0.050 | 0.142 | 0.078 |   |   |   | 0.482 | 0.050 | 0.142 | 0.078    |
| Cyclohexene                       | 49           | 49       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| Cyclopentane                      | 49           | 2        | 0.052 | 0.119 | 0.174 | 0.200 | 0.233 | 0.509 | 0.050 | 0.168 | 0.076 |   |   |   | 0.509 | 0.050 | 0.168 | 0.076    |
| Cyclopentene                      | 49           | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.082 | 0.050 | 0.051 | 0.005 |   |   |   | 0.082 | 0.050 | 0.051 | 0.005    |
| Decane                            | 49           | 3        | 0.050 | 0.164 | 0.249 | 0.327 | 0.628 | 0.977 | 0.050 | 0.287 | 0.206 |   |   |   | 0.977 | 0.050 | 0.287 | 0.206    |
| Dibromochloromethane              | 49           | 49       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| Dibromomethane                    | 49           | 49       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| Diethylmethane                    | 49           | 0        | 0.225 | 0.320 | 0.401 | 0.495 | 0.564 | 0.752 | 0.203 | 0.408 | 0.120 |   |   |   | 0.752 | 0.203 | 0.408 | 0.120    |
| d-Limonene                        | 49           | 11       | 0.050 | 0.056 | 0.077 | 0.097 | 0.128 | 0.191 | 0.050 | 0.082 | 0.033 |   |   |   | 0.191 | 0.050 | 0.082 | 0.033    |
| Dodecane                          | 49           | 8        | 0.050 | 0.091 | 0.131 | 0.197 | 0.416 | 0.614 | 0.050 | 0.176 | 0.139 |   |   |   | 0.614 | 0.050 | 0.176 | 0.139    |
| EDB                               | 49           | 49       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| Ethane                            | 49           | 0        | 1.672 | 1.937 | 2.421 | 3.546 | 5.288 | 6.678 | 1.502 | 2.918 | 1.360 |   |   |   | 6.678 | 1.502 | 2.918 | 1.360    |
| Ethylbenzene                      | 49           | 0        | 0.187 | 0.387 | 0.496 | 0.607 | 0.688 | 1.100 | 0.112 | 0.490 | 0.187 |   |   |   | 1.100 | 0.112 | 0.490 | 0.187    |
| Ethylbromide                      | 49           | 49       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| Ethylene                          | 49           | 0        | 0.702 | 1.004 | 1.403 | 2.165 | 3.973 | 7.327 | 0.395 | 1.865 | 1.369 |   |   |   | 7.327 | 0.395 | 1.865 | 1.369    |
| Freon11                           | 49           | 0        | 1.539 | 1.688 | 1.746 | 1.900 | 2.074 | 2.692 | 1.488 | 1.810 | 0.214 |   |   |   | 2.692 | 1.488 | 1.810 | 0.214    |
| Freon113                          | 49           | 0        | 0.503 | 0.536 | 0.617 | 0.687 | 0.734 | 0.751 | 0.496 | 0.615 | 0.079 |   |   |   | 0.751 | 0.496 | 0.615 | 0.079    |
| Freon114                          | 49           | 0        | 0.100 | 0.107 | 0.113 | 0.121 | 0.127 | 0.138 | 0.087 | 0.114 | 0.011 |   |   |   | 0.138 | 0.087 | 0.114 | 0.011    |
| Freon12                           | 49           | 0        | 2.372 | 2.568 | 2.729 | 3.057 | 3.265 | 3.265 | 2.067 | 2.738 | 0.265 |   |   |   | 3.265 | 2.067 | 2.738 | 0.265    |
| Freon22                           | 49           | 0        | 0.577 | 0.678 | 0.752 | 0.872 | 1.012 | 1.356 | 0.536 | 0.798 | 0.172 |   |   |   | 1.356 | 0.536 | 0.798 | 0.172    |
| Heptane                           | 49           | 0        | 0.071 | 0.182 | 0.226 | 0.302 | 0.404 | 0.652 | 0.068 | 0.249 | 0.121 |   |   |   | 0.652 | 0.068 | 0.249 | 0.121    |
| Hexachlorobutadiene               | 49           | 49       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| Hexane                            | 49           | 0        | 0.217 | 0.475 | 0.637 | 0.823 | 1.069 | 1.871 | 0.150 | 0.674 | 0.310 |   |   |   | 1.871 | 0.150 | 0.674 | 0.310    |

Table 22: VOC Annual Statistics at Ottawa (2003)

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds                     | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | N<br>75% | T<br>90% | L<br>95% | S | Max    | Min   | Mean  | Std.Dev. |
|-------------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|---|--------|-------|-------|----------|
| Hexylbenzene                  | 46              | 46       |         |          |          |          |          |          |   |        |       |       |          |
| Indane                        | 49              | 28       | 0.050   | 0.050    | 0.050    | 0.062    | 0.072    | 0.072    |   | 0.119  | 0.050 | 0.057 | 0.014    |
| Isobutane                     | 49              | 0        | 0.532   | 0.961    | 1.444    | 2.681    | 4.138    | 4.138    |   | 8.790  | 0.344 | 2.057 | 1.622    |
| iso-Butylbenzene              | 49              | 49       |         |          |          |          |          |          |   |        |       |       |          |
| Isopentane                    | 49              | 0        | 0.913   | 1.979    | 2.845    | 3.869    | 4.672    | 4.672    |   | 9.757  | 0.568 | 3.009 | 1.586    |
| Isoprene                      | 49              | 5        | 0.050   | 0.081    | 0.098    | 0.319    | 0.751    | 1.592    |   | 1.592  | 0.050 | 0.272 | 0.360    |
| iso-Propylbenzene             | 49              | 47       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.061  | 0.050 | 0.050 | 0.002    |
| m and p-Xylene                | 49              | 2        | 0.253   | 1.034    | 1.443    | 1.727    | 2.158    | 2.593    |   | 2.593  | 0.050 | 1.380 | 0.601    |
| Methylcyclohexane             | 49              | 4        | 0.050   | 0.100    | 0.131    | 0.153    | 0.218    | 0.218    |   | 0.990  | 0.050 | 0.148 | 0.134    |
| Methylcyclopentane            | 49              | 0        | 0.115   | 0.279    | 0.346    | 0.414    | 0.567    | 1.181    |   | 1.181  | 0.086 | 0.364 | 0.180    |
| MTBE                          | 49              | 29       | 0.050   | 0.050    | 0.050    | 0.078    | 0.112    | 0.249    |   | 0.249  | 0.050 | 0.071 | 0.045    |
| Naphthalene                   | 49              | 3        | 0.050   | 0.100    | 0.155    | 0.194    | 0.258    | 0.338    |   | 0.338  | 0.050 | 0.155 | 0.067    |
| n-Butylbenzene                | 49              | 49       |         |          |          |          |          |          |   |        |       |       |          |
| Nonane                        | 49              | 3        | 0.050   | 0.112    | 0.145    | 0.194    | 0.276    | 0.413    |   | 0.413  | 0.050 | 0.163 | 0.083    |
| n-Propylbenzene               | 49              | 6        | 0.050   | 0.069    | 0.096    | 0.115    | 0.131    | 0.212    |   | 0.212  | 0.050 | 0.096 | 0.035    |
| Octane                        | 49              | 6        | 0.050   | 0.076    | 0.115    | 0.138    | 0.209    | 0.287    |   | 0.287  | 0.050 | 0.118 | 0.055    |
| o-Xylene                      | 49              | 0        | 0.169   | 0.380    | 0.507    | 0.587    | 0.729    | 1.163    |   | 1.163  | 0.092 | 0.489 | 0.202    |
| p-Cymene                      | 49              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.051    | 0.119    |   | 0.119  | 0.050 | 0.052 | 0.010    |
| Pentane                       | 49              | 0        | 0.503   | 0.818    | 1.205    | 1.700    | 2.180    | 4.044    |   | 4.044  | 0.246 | 1.328 | 0.683    |
| Propane                       | 49              | 0        | 0.870   | 1.506    | 2.097    | 2.852    | 4.161    | 6.457    |   | 6.457  | 0.583 | 2.396 | 1.328    |
| Propylene                     | 49              | 0        | 0.223   | 0.417    | 0.497    | 0.724    | 1.229    | 2.317    |   | 2.317  | 0.177 | 0.619 | 0.389    |
| sec-Butylbenzene              | 49              | 49       |         |          |          |          |          |          |   |        |       |       |          |
| Styrene                       | 49              | 16       | 0.050   | 0.050    | 0.065    | 0.082    | 0.127    | 0.182    |   | 0.182  | 0.050 | 0.072 | 0.029    |
| tert-Butylbenzene             | 49              | 49       |         |          |          |          |          |          |   |        |       |       |          |
| Tetrachloroethylene           | 49              | 0        | 0.093   | 0.202    | 0.276    | 0.470    | 1.370    | 4.247    |   | 4.247  | 0.076 | 0.520 | 0.700    |
| Toluene                       | 49              | 0        | 0.770   | 2.065    | 2.916    | 3.837    | 4.563    | 12.675   |   | 12.675 | 0.635 | 3.134 | 1.972    |
| trans-1,2-Dichloroethylene    | 49              | 49       |         |          |          |          |          |          |   |        |       |       |          |
| trans-1,2-Dimethylcyclohexane | 49              | 49       |         |          |          |          |          |          |   |        |       |       |          |
| trans-1,3-Dichloropropene     | 49              | 49       |         |          |          |          |          |          |   |        |       |       |          |
| trans-1,4-Dimethylcyclohexane | 49              | 47       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.160  | 0.050 | 0.052 | 0.016    |
| trans-2-Butene                | 49              | 2        | 0.064   | 0.112    | 0.182    | 0.241    | 0.371    | 1.061    |   | 1.061  | 0.050 | 0.213 | 0.166    |
| trans-2-Heptene               | 49              | 49       |         |          |          |          |          |          |   |        |       |       |          |
| trans-2-Hexene                | 49              | 37       | 0.050   | 0.050    | 0.050    | 0.050    | 0.056    | 0.127    |   | 0.127  | 0.050 | 0.053 | 0.013    |
| trans-2-Octene                | 49              | 45       | 0.050   | 0.050    | 0.050    | 0.050    | 0.225    | 0.050    |   | 0.225  | 0.050 | 0.055 | 0.026    |
| trans-2-Pentene               | 49              | 3        | 0.050   | 0.112    | 0.155    | 0.201    | 0.258    | 0.646    |   | 0.646  | 0.050 | 0.166 | 0.093    |
| trans-3-Heptene               | 49              | 49       |         |          |          |          |          |          |   |        |       |       |          |
| trans-3-Methyl-2-pentene      | 49              | 48       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.063  | 0.050 | 0.050 | 0.002    |

**Table 22: VOC Annual Statistics at Ottawa (2003)**  
Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | C<br>75% | T<br>90% | I<br>95% | E<br>99% | S     | Max   | Min   | Mean  | Std.Dev. |
|--------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|----------|-------|-------|-------|-------|----------|
| trans-4-Methyl-2-pentene | 49              | 49       |         |          |          |          |          |          |          |       |       |       |       |          |
| Trichloroethylene        | 49              | 25       | 0.050   | 0.050    | 0.050    | 0.066    | 0.110    | 0.341    | 0.450    | 0.073 | 0.059 | 0.050 | 0.073 | 0.059    |
| Undecane                 | 49              | 3        | 0.050   | 0.153    | 0.248    | 0.373    | 0.793    | 1.416    | 0.050    | 0.330 | 0.295 | 0.050 | 0.330 | 0.295    |
| Vinylchloride            | 49              | 49       |         |          |          |          |          |          |          |       |       |       |       |          |

**Table 23: VOC Annual Statistics at Sarnia (2003)**

Unit: micrograms per cubic metre (µg/m³)

| Compounds                 | # of Samples | No. < DL | P 5%  | E R C E N 25% 50% | T I L 75% | E 90% | S     | Max   | Min   | Mean  | Std.Dev. |
|---------------------------|--------------|----------|-------|-------------------|-----------|-------|-------|-------|-------|-------|----------|
| 1,1,1-Trichloroethane     | 36           | 0        | 0.147 | 0.158             | 0.175     | 0.191 | 0.213 | 1.284 | 0.144 | 0.206 | 0.186    |
| 1,1,2,2-Tetrachloroethane | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1,1,2-Trichloroethane     | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1,1-Dichloroethane        | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1,1-Dichloroethylene      | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1,2,3-Trimethylbenzene    | 36           | 9        | 0.050 | 0.053             | 0.099     | 0.202 | 0.329 | 1.203 | 0.050 | 0.172 | 0.217    |
| 1,2,4-Trichlorobenzene    | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1,2,4-Trimethylbenzene    | 36           | 5        | 0.050 | 0.246             | 0.423     | 0.845 | 1.302 | 3.629 | 0.050 | 0.615 | 0.692    |
| 1,2-Dichlorobenzene       | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1,2-Dichloroethane        | 36           | 28       | 0.050 | 0.050             | 0.050     | 0.050 | 0.060 | 0.100 | 0.050 | 0.053 | 0.009    |
| 1,2-Dichloropropane       | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1,2-Dichlorobenzene       | 36           | 34       | 0.050 | 0.050             | 0.050     | 0.050 | 0.050 | 0.133 | 0.050 | 0.053 | 0.014    |
| 1,3,5-Trimethylbenzene    | 36           | 7        | 0.050 | 0.068             | 0.114     | 0.236 | 0.376 | 1.012 | 0.050 | 0.179 | 0.188    |
| 1,3-Butadiene             | 36           | 7        | 0.050 | 0.068             | 0.135     | 0.363 | 0.798 | 3.132 | 0.050 | 0.355 | 0.691    |
| 1,3-Dichlorobenzene       | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1,3-Diethylbenzene        | 36           | 26       | 0.050 | 0.050             | 0.050     | 0.051 | 0.086 | 0.305 | 0.050 | 0.065 | 0.046    |
| 1,4-Dichlorobenzene       | 36           | 6        | 0.050 | 0.057             | 0.083     | 0.128 | 0.150 | 0.206 | 0.050 | 0.094 | 0.043    |
| 1,4-Dichlorobutane        | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1,4-Diethylbenzene        | 36           | 12       | 0.050 | 0.050             | 0.086     | 0.170 | 0.293 | 1.084 | 0.050 | 0.153 | 0.193    |
| 1-Butene/isobutene        | 36           | 0        | 0.103 | 0.332             | 0.952     | 1.826 | 3.566 | 6.525 | 0.095 | 1.395 | 1.577    |
| 1-Butyne                  | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1-Decene                  | 36           | 35       | 0.050 | 0.050             | 0.050     | 0.050 | 0.050 | 0.054 | 0.050 | 0.050 | 0.001    |
| 1-Heptene                 | 36           | 34       | 0.050 | 0.050             | 0.050     | 0.050 | 0.050 | 1.822 | 0.050 | 0.102 | 0.295    |
| 1-Hexene                  | 36           | 11       | 0.050 | 0.050             | 0.104     | 0.192 | 0.275 | 0.405 | 0.050 | 0.129 | 0.092    |
| 1-Methylcyclohexene       | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1-Methylcyclopentene      | 36           | 26       | 0.050 | 0.050             | 0.050     | 0.057 | 0.080 | 0.113 | 0.050 | 0.058 | 0.015    |
| 1-Nonene                  | 36           | 36       |       |                   |           |       |       |       |       |       |          |
| 1-Octene                  | 36           | 31       | 0.050 | 0.050             | 0.050     | 0.050 | 0.079 | 0.658 | 0.050 | 0.076 | 0.109    |
| 1-Pentene                 | 36           | 9        | 0.050 | 0.056             | 0.116     | 0.182 | 0.225 | 0.301 | 0.050 | 0.128 | 0.074    |
| 1-Propyne                 | 36           | 13       | 0.050 | 0.050             | 0.069     | 0.081 | 0.093 | 0.172 | 0.050 | 0.071 | 0.027    |
| 1-Undecene                | 36           | 25       | 0.050 | 0.050             | 0.050     | 0.108 | 1.341 | 2.182 | 0.050 | 0.293 | 0.545    |
| 2,2,3-Trimethylbutane     | 36           | 36       | 0.059 | 0.165             | 0.415     | 0.713 | 1.536 | 4.322 | 0.050 | 0.657 | 0.842    |
| 2,2,4-Trimethylpentane    | 36           | 1        |       |                   |           |       |       |       |       |       |          |
| 2,2,5-Trimethylhexane     | 36           | 34       | 0.050 | 0.050             | 0.050     | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.002    |
| 2,2-Dimethylbutane        | 36           | 6        | 0.050 | 0.078             | 0.174     | 0.252 | 0.314 | 0.499 | 0.050 | 0.184 | 0.117    |
| 2,2-Dimethylhexane        | 36           | 34       | 0.050 | 0.050             | 0.050     | 0.050 | 0.050 | 0.140 | 0.050 | 0.053 | 0.015    |
| 2,2-Dimethylpentane       | 36           | 22       | 0.050 | 0.050             | 0.050     | 0.058 | 0.091 | 0.191 | 0.050 | 0.061 | 0.027    |

**Table 23: VOC Annual Statistics at Sarnia (2003)**

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds              | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | N<br>75% | I<br>90% | L<br>E | S<br>Max | Min   | Mean  | Std.Dev. |
|------------------------|-----------------|----------|---------|----------|----------|----------|----------|--------|----------|-------|-------|----------|
| 2,2-Dimethylpropane    | 36              | 25       | 0.050   | 0.050    | 0.050    | 0.052    | 0.080    |        | 0.097    | 0.050 | 0.057 | 0.014    |
| 2,3,4-Trimethylpentane | 36              | 7        | 0.050   | 0.055    | 0.105    | 0.245    | 0.346    |        | 0.958    | 0.050 | 0.171 | 0.180    |
| 2,3-Dimethylbutane     | 36              | 3        | 0.050   | 0.112    | 0.343    | 0.471    | 0.702    |        | 1.382    | 0.050 | 0.370 | 0.289    |
| 2,3-Dimethylpentane    | 36              | 3        | 0.050   | 0.113    | 0.240    | 0.437    | 0.702    |        | 1.288    | 0.050 | 0.370 | 0.289    |
| 2,4-Dimethylhexane     | 36              | 13       | 0.050   | 0.050    | 0.099    | 0.150    | 0.325    |        | 0.524    | 0.050 | 0.129 | 0.115    |
| 2,4-Dimethylpentane    | 36              | 8        | 0.050   | 0.053    | 0.136    | 0.179    | 0.273    |        | 0.586    | 0.050 | 0.149 | 0.108    |
| 2,5-Dimethylhexane     | 36              | 14       | 0.050   | 0.050    | 0.068    | 0.125    | 0.230    |        | 0.410    | 0.050 | 0.103 | 0.085    |
| 2-Ethyl-1-butene       | 36              | 36       |         |          |          |          |          |        |          |       |       |          |
| 2-Ethyltoluene         | 36              | 7        | 0.050   | 0.063    | 0.113    | 0.200    | 0.367    |        | 0.826    | 0.050 | 0.159 | 0.152    |
| 2-methyl-1-butene      | 36              | 6        | 0.050   | 0.070    | 0.203    | 0.271    | 0.375    |        | 0.440    | 0.050 | 0.192 | 0.120    |
| 2-Methyl-2-butene      | 36              | 7        | 0.050   | 0.097    | 0.227    | 0.486    | 0.696    |        | 1.093    | 0.050 | 0.263 | 0.263    |
| 2-Methylheptane        | 36              | 7        | 0.050   | 0.062    | 0.168    | 0.246    | 0.365    |        | 1.930    | 0.050 | 0.221 | 0.320    |
| 2-Methylhexane         | 36              | 0        | 0.068   | 0.197    | 0.519    | 0.814    | 0.979    |        | 2.967    | 0.063 | 0.564 | 0.515    |
| 2-Methylpentane        | 36              | 0        | 0.147   | 0.517    | 1.807    | 2.593    | 3.725    |        | 7.702    | 0.103 | 1.898 | 1.624    |
| 3,6-Dimethyloctane     | 36              | 31       | 0.050   | 0.050    | 0.050    | 0.050    | 0.061    |        | 0.252    | 0.050 | 0.059 | 0.035    |
| 3-Ethyltoluene         | 36              | 6        | 0.050   | 0.141    | 0.270    | 0.462    | 0.863    |        | 1.667    | 0.050 | 0.340 | 0.326    |
| 3-Methyl-1-Butene      | 36              | 22       | 0.050   | 0.050    | 0.050    | 0.064    | 0.089    |        | 0.109    | 0.050 | 0.060 | 0.017    |
| 3-Methyl-1-pentene     | 36              | 36       |         |          |          |          |          |        |          |       |       |          |
| 3-Methylheptane        | 36              | 9        | 0.050   | 0.056    | 0.157    | 0.231    | 0.319    |        | 1.222    | 0.050 | 0.186 | 0.208    |
| 3-Methylhexane         | 36              | 0        | 0.074   | 0.176    | 0.522    | 0.847    | 1.004    |        | 3.576    | 0.053 | 0.604 | 0.612    |
| 3-Methylpentane        | 36              | 0        | 0.125   | 0.342    | 1.256    | 2.167    | 3.363    |        | 5.140    | 0.091 | 1.481 | 1.321    |
| 4-Ethyltoluene         | 36              | 8        | 0.050   | 0.071    | 0.135    | 0.232    | 0.427    |        | 0.919    | 0.050 | 0.179 | 0.171    |
| 4-Methyl-1-pentene     | 36              | 36       |         |          |          |          |          |        |          |       |       |          |
| 4-Methylheptane        | 36              | 14       | 0.050   | 0.050    | 0.068    | 0.089    | 0.124    |        | 0.534    | 0.050 | 0.087 | 0.085    |
| Acetylene              | 36              | 0        | 0.515   | 0.828    | 0.979    | 1.384    | 1.890    |        | 2.249    | 0.493 | 1.093 | 0.463    |
| a-Pinene               | 36              | 12       | 0.050   | 0.050    | 0.208    | 0.501    | 0.839    |        | 1.432    | 0.050 | 0.357 | 0.357    |
| Benzene                | 36              | 0        | 0.533   | 0.837    | 1.417    | 2.023    | 4.168    |        | 4.824    | 0.462 | 1.674 | 1.189    |
| Benzylchloride         | 36              | 36       |         |          |          |          |          |        |          |       |       |          |
| b-Pinene               | 36              | 23       | 0.050   | 0.050    | 0.050    | 0.078    | 0.111    |        | 0.174    | 0.050 | 0.068 | 0.033    |
| Bromodichloromethane   | 36              | 30       | 0.050   | 0.050    | 0.050    | 0.050    | 0.089    |        | 0.390    | 0.050 | 0.064 | 0.058    |
| Bromoforn              | 36              | 36       |         |          |          |          |          |        |          |       |       |          |
| Bromomethane           | 36              | 0        | 0.054   | 0.070    | 0.075    | 0.092    | 0.146    |        | 0.267    | 0.053 | 0.089 | 0.043    |
| Butane                 | 36              | 0        | 1.270   | 3.153    | 8.238    | 12.870   | 17.315   |        | 25.144   | 1.068 | 8.530 | 6.333    |
| Camphene               | 36              | 36       |         |          |          |          |          |        |          |       |       |          |
| Carbontetrachloride    | 36              | 0        | 0.566   | 0.610    | 0.643    | 0.674    | 0.718    |        | 0.745    | 0.548 | 0.644 | 0.048    |
| Chlorobenzene          | 36              | 36       |         |          |          |          |          |        |          |       |       |          |
| Chloroethane           | 36              | 32       | 0.050   | 0.050    | 0.050    | 0.050    | 0.059    |        | 0.131    | 0.050 | 0.054 | 0.015    |

**Table 23: VOC Annual Statistics at Sarnia (2003)**

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds                       | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | C<br>75% | N<br>90% | S<br>95% | Max    | Min   | Mean  | Std.Dev. |
|---------------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|--------|-------|-------|----------|
| Chloroform                      | 36              | 1        | 0.069   | 0.094    | 0.129    | 0.172    | 0.205    | 0.205    | 0.459  | 0.050 | 0.144 | 0.088    |
| Chloromethane                   | 36              | 0        | 1.043   | 1.201    | 1.821    | 3.828    | 8.325    | 11.274   | 11.274 | 1.032 | 3.182 | 3.069    |
| cis-1,2-Dichloroethylene        | 36              | 36       |         |          |          |          |          |          |        |       |       |          |
| cis-1,2-Dimethylcyclohexane     | 36              | 33       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.113  | 0.050 | 0.052 | 0.010    |
| cis-1,3-Dichloropropene         | 36              | 36       |         |          |          |          |          |          |        |       |       |          |
| cis-1,3-Dimethylcyclohexane     | 36              | 14       | 0.050   | 0.050    | 0.072    | 0.123    | 0.175    | 0.175    | 0.865  | 0.050 | 0.108 | 0.140    |
| cis-1,4-1,3-Dimethylcyclohexane | 36              | 33       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.189  | 0.050 | 0.055 | 0.024    |
| cis-2-Butene                    | 36              | 8        | 0.050   | 0.055    | 0.240    | 0.349    | 0.510    | 0.225    | 1.058  | 0.050 | 0.249 | 0.225    |
| cis-2-Heptene                   | 36              | 34       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.090  | 0.050 | 0.051 | 0.007    |
| cis-2-Hexene                    | 36              | 32       | 0.050   | 0.050    | 0.050    | 0.050    | 0.056    | 0.006    | 0.085  | 0.050 | 0.052 | 0.006    |
| cis-2-Pentene                   | 36              | 11       | 0.050   | 0.050    | 0.121    | 0.185    | 0.242    | 0.079    | 0.315  | 0.050 | 0.125 | 0.079    |
| cis-3-Heptene                   | 36              | 21       | 0.050   | 0.050    | 0.050    | 0.087    | 0.126    | 0.041    | 0.230  | 0.050 | 0.071 | 0.041    |
| cis-3-Methyl-2-pentene          | 36              | 24       | 0.050   | 0.050    | 0.050    | 0.084    | 0.128    | 0.034    | 0.167  | 0.050 | 0.069 | 0.034    |
| cis-4-Methyl-2-pentene          | 36              | 21       | 0.050   | 0.050    | 0.050    | 0.064    | 0.095    | 0.018    | 0.119  | 0.050 | 0.061 | 0.018    |
| Cyclohexane                     | 36              | 4        | 0.050   | 0.129    | 0.346    | 1.445    | 4.083    | 1.752    | 6.290  | 0.050 | 1.164 | 1.752    |
| Cyclohexene                     | 36              | 36       |         |          |          |          |          |          |        |       |       |          |
| Cyclopentane                    | 36              | 4        | 0.050   | 0.119    | 0.372    | 0.502    | 0.777    | 0.793    | 4.185  | 0.050 | 0.531 | 0.793    |
| Cyclopentene                    | 36              | 25       | 0.050   | 0.050    | 0.050    | 0.053    | 0.069    | 0.008    | 0.082  | 0.050 | 0.054 | 0.008    |
| Decane                          | 36              | 6        | 0.050   | 0.092    | 0.273    | 0.693    | 1.763    | 2.149    | 12.073 | 0.050 | 0.938 | 2.149    |
| Dibromochloromethane            | 36              | 36       |         |          |          |          |          |          |        |       |       |          |
| Dibromomethane                  | 36              | 36       |         |          |          |          |          |          |        |       |       |          |
| Dichloromethane                 | 36              | 0        | 0.191   | 0.330    | 0.407    | 0.490    | 0.701    | 0.247    | 1.596  | 0.186 | 0.448 | 0.247    |
| d-Limonene                      | 36              | 28       | 0.050   | 0.050    | 0.050    | 0.050    | 0.082    | 0.025    | 0.169  | 0.050 | 0.060 | 0.025    |
| Dodecane                        | 36              | 8        | 0.050   | 0.095    | 0.277    | 0.577    | 0.766    | 0.473    | 2.445  | 0.050 | 0.391 | 0.473    |
| Ethylbenzene                    | 36              | 36       |         |          |          |          |          |          |        |       |       |          |
| Ethylbenzene                    | 36              | 0        | 2.529   | 3.371    | 4.885    | 7.654    | 9.869    | 3.309    | 16.269 | 2.000 | 5.810 | 3.309    |
| Ethylbromide                    | 36              | 2        | 0.050   | 0.256    | 0.523    | 0.690    | 1.295    | 0.628    | 2.884  | 0.050 | 0.650 | 0.628    |
| Ethylene                        | 36              | 36       |         |          |          |          |          |          |        |       |       |          |
| Freon11                         | 36              | 0        | 0.788   | 1.522    | 3.208    | 5.945    | 11.932   | 4.560    | 20.820 | 0.675 | 4.544 | 4.560    |
| Freon113                        | 36              | 0        | 1.591   | 1.730    | 1.833    | 1.915    | 2.019    | 0.258    | 3.104  | 1.555 | 1.853 | 0.258    |
| Freon114                        | 36              | 0        | 0.673   | 0.884    | 1.763    | 2.941    | 4.195    | 1.398    | 6.266  | 0.660 | 2.032 | 1.398    |
| Freon12                         | 36              | 0        | 0.109   | 0.112    | 0.117    | 0.123    | 0.127    | 0.006    | 0.130  | 0.108 | 0.118 | 0.006    |
| Freon22                         | 36              | 0        | 2.673   | 3.024    | 3.304    | 3.970    | 4.332    | 0.574    | 4.549  | 2.618 | 3.413 | 0.574    |
| Heptane                         | 36              | 0        | 0.542   | 0.604    | 0.657    | 0.724    | 0.839    | 0.370    | 0.734  | 0.538 | 0.734 | 0.370    |
| Hexachlorobutadiene             | 36              | 1        | 0.050   | 0.165    | 0.408    | 0.696    | 0.957    | 0.940    | 5.676  | 0.050 | 0.595 | 0.940    |
| Hexachlorobutadiene             | 36              | 36       |         |          |          |          |          |          |        |       |       |          |
| Hexane                          | 36              | 0        | 0.130   | 0.445    | 1.631    | 2.988    | 5.859    | 2.466    | 10.106 | 0.099 | 2.218 | 2.466    |



**Table 23: VOC Annual Statistics at Sarmia (2003)**

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds                     | # of<br>Samples | No. < DL | 5%    | P     | E     | R     | C     | E     | N      | T      | I      | L      | E      | S      | Max    | Min   | Mean  | Std.Dev. |
|-------------------------------|-----------------|----------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|-------|-------|----------|
| Hexylbenzene                  | 34              | 34       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.082  | 0.139  | 0.139  | 0.139  | 0.139  | 0.267  | 0.050 | 0.073 | 0.044    |
| Indane                        | 36              | 21       | 0.437 | 0.437 | 1.272 | 1.272 | 3.225 | 3.225 | 5.361  | 5.361  | 5.795  | 5.795  | 5.795  | 5.795  | 13.170 | 0.414 | 3.602 | 3.104    |
| Isobutane                     | 36              | 0        | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.111  | 0.050 | 0.052 | 0.010    |
| iso-Butylbenzene              | 36              | 34       | 0.867 | 0.867 | 2.034 | 2.034 | 6.125 | 6.125 | 9.584  | 9.584  | 12.068 | 12.068 | 12.068 | 12.068 | 16.565 | 0.710 | 6.419 | 4.366    |
| Isopentane                    | 36              | 0        | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 1.166  | 0.050 | 0.149 | 0.205    |
| Isoprene                      | 36              | 12       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.177  | 0.050 | 0.063 | 0.029    |
| iso-Propylbenzene             | 36              | 24       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 5.044  | 0.050 | 1.409 | 1.078    |
| m and p-Xylene                | 36              | 1        | 0.052 | 0.052 | 0.560 | 0.560 | 1.361 | 1.361 | 1.794  | 1.794  | 2.651  | 2.651  | 2.651  | 2.651  | 5.044  | 0.050 | 0.392 | 0.741    |
| Methylcyclohexane             | 36              | 6        | 0.050 | 0.050 | 0.091 | 0.091 | 0.197 | 0.197 | 0.470  | 0.470  | 0.625  | 0.625  | 0.625  | 0.625  | 4.471  | 0.050 | 0.846 | 0.979    |
| Methylcyclopentane            | 36              | 1        | 0.061 | 0.061 | 0.191 | 0.191 | 0.669 | 0.669 | 1.011  | 1.011  | 1.742  | 1.742  | 1.742  | 1.742  | 5.175  | 0.050 | 0.054 | 0.016    |
| MTBE                          | 36              | 33       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.145  | 0.050 | 0.188 | 0.107    |
| Naphthalene                   | 36              | 6        | 0.050 | 0.050 | 0.068 | 0.068 | 0.201 | 0.201 | 0.275  | 0.275  | 0.333  | 0.333  | 0.333  | 0.333  | 0.409  | 0.050 | 0.072 | 0.064    |
| n-Butylbenzene                | 36              | 24       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 4.179  | 0.050 | 0.453 | 0.754    |
| Nonane                        | 36              | 6        | 0.050 | 0.050 | 0.088 | 0.088 | 0.224 | 0.224 | 0.538  | 0.538  | 1.226  | 1.226  | 1.226  | 1.226  | 4.179  | 0.050 | 0.142 | 0.118    |
| n-Propylbenzene               | 36              | 7        | 0.050 | 0.050 | 0.058 | 0.058 | 0.109 | 0.109 | 0.175  | 0.175  | 0.317  | 0.317  | 0.317  | 0.317  | 0.610  | 0.050 | 0.312 | 0.471    |
| Octane                        | 36              | 6        | 0.050 | 0.050 | 0.064 | 0.064 | 0.217 | 0.217 | 0.390  | 0.390  | 0.539  | 0.539  | 0.539  | 0.539  | 2.754  | 0.050 | 0.517 | 0.413    |
| o-Xylene                      | 36              | 2        | 0.050 | 0.050 | 0.196 | 0.196 | 0.499 | 0.499 | 0.660  | 0.660  | 0.883  | 0.883  | 0.883  | 0.883  | 2.030  | 0.050 | 0.059 | 0.036    |
| p-Cymene                      | 36              | 32       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.255  | 0.050 | 0.059 | 0.036    |
| Pentane                       | 36              | 0        | 0.521 | 0.521 | 1.144 | 1.144 | 3.561 | 3.561 | 4.684  | 4.684  | 6.977  | 6.977  | 6.977  | 6.977  | 16.169 | 0.512 | 3.549 | 3.004    |
| Propane                       | 36              | 0        | 1.972 | 1.972 | 3.583 | 3.583 | 6.285 | 6.285 | 12.322 | 12.322 | 17.756 | 17.756 | 17.756 | 17.756 | 28.624 | 1.914 | 8.416 | 6.786    |
| Propylene                     | 36              | 0        | 0.207 | 0.207 | 0.537 | 0.537 | 1.611 | 1.611 | 2.950  | 2.950  | 6.839  | 6.839  | 6.839  | 6.839  | 14.586 | 0.198 | 2.575 | 3.169    |
| sec-Butylbenzene              | 36              | 31       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.215  | 0.050 | 0.057 | 0.029    |
| Styrene                       | 36              | 8        | 0.050 | 0.050 | 0.078 | 0.078 | 0.139 | 0.139 | 0.214  | 0.214  | 0.333  | 0.333  | 0.333  | 0.333  | 0.688  | 0.050 | 0.167 | 0.138    |
| tert-Butylbenzene             | 36              | 36       | 0.053 | 0.053 | 0.128 | 0.128 | 0.196 | 0.196 | 0.300  | 0.300  | 0.412  | 0.412  | 0.412  | 0.412  | 0.890  | 0.050 | 0.227 | 0.169    |
| Tetrachloroethylene           | 36              | 0        | 0.363 | 0.363 | 1.447 | 1.447 | 3.477 | 3.477 | 5.368  | 5.368  | 7.544  | 7.544  | 7.544  | 7.544  | 35.982 | 0.360 | 4.491 | 5.939    |
| Toluene                       | 36              | 0        | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.064 | 0.054    |
| trans-1,2-Dichloroethylene    | 36              | 36       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.364  | 0.050 | 0.278 | 0.242    |
| trans-1,2-Dimethylcyclohexane | 36              | 36       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 1.280  | 0.050 | 0.068 | 0.025    |
| trans-1,3-Dichloropropene     | 36              | 36       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.142  | 0.050 | 0.090 | 0.114    |
| trans-1,4-Dimethylcyclohexane | 36              | 26       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.710  | 0.050 | 0.257 | 0.195    |
| trans-2-Butene                | 36              | 7        | 0.050 | 0.050 | 0.074 | 0.074 | 0.277 | 0.277 | 0.425  | 0.425  | 0.493  | 0.493  | 0.493  | 0.493  | 0.051  | 0.050 | 0.050 | 0.000    |
| trans-2-Heptene               | 36              | 36       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.051  | 0.050 | 0.051 | 0.003    |
| trans-2-Hexene                | 36              | 19       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.142  | 0.050 | 0.068 | 0.025    |
| trans-2-Octene                | 36              | 20       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.710  | 0.050 | 0.090 | 0.114    |
| trans-2-Pentene               | 36              | 8        | 0.050 | 0.050 | 0.082 | 0.082 | 0.252 | 0.252 | 0.415  | 0.415  | 0.523  | 0.523  | 0.523  | 0.523  | 0.051  | 0.050 | 0.050 | 0.000    |
| trans-3-Heptene               | 36              | 35       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.051  | 0.050 | 0.050 | 0.000    |
| trans-3-Methyl-2-pentene      | 36              | 32       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.050  | 0.063  | 0.050 | 0.051 | 0.003    |

**Table 23: VOC Annual Statistics at Sarnia (2003)**

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                | # of<br>Samples | No. < DL | P E R C E N T I L E S |       |       |       |       | Max    | Min   | Mean  | Std.Dev. |
|--------------------------|-----------------|----------|-----------------------|-------|-------|-------|-------|--------|-------|-------|----------|
|                          |                 |          | 5%                    | 25%   | 50%   | 75%   | 90%   |        |       |       |          |
| trans-4-Methyl-2-pentene | 36              | 36       |                       |       |       |       |       |        |       |       |          |
| Trichloroethylene        | 36              | 7        | 0.050                 | 0.053 | 0.081 | 0.103 | 0.123 | 0.207  | 0.050 | 0.082 | 0.033    |
| Undecane                 | 36              | 7        | 0.050                 | 0.141 | 0.372 | 0.708 | 1.909 | 10.461 | 0.050 | 0.900 | 1.901    |
| Vinylchloride            | 36              | 30       | 0.050                 | 0.050 | 0.050 | 0.050 | 0.082 | 0.776  | 0.050 | 0.078 | 0.123    |

**Table 24: VOC Annual Statistics at Simcoe (2003)**  
Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds                 | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | C<br>75% | N<br>90% | L<br>95% | E<br>99% | S | Max   | Min   | Mean  | Std.Dev. |
|---------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|----------|---|-------|-------|-------|----------|
| 1,1,1-Trichloroethane     | 45              | 0        | 0.144   | 0.152    | 0.157    | 0.175    | 0.191    |          |          |   | 0.210 | 0.142 | 0.164 | 0.018    |
| 1,1,2,2-Tetrachloroethane | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 1,1,2-Trichloroethane     | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 1,1-Dichloroethane        | 45              | 45       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.077 | 0.050 | 0.051 | 0.004    |
| 1,1-Dichloroethylene      | 45              | 43       | 0.050   | 0.050    | 0.050    | 0.050    | 0.051    | 0.051    | 0.051    |   | 0.080 | 0.050 | 0.051 | 0.005    |
| 1,2,3-Trimethylbenzene    | 45              | 38       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.086 | 0.050 | 0.051 | 0.006    |
| 1,2,4-Trichlorobenzene    | 45              | 43       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.086 | 0.050 | 0.051 | 0.006    |
| 1,2,4-Trimethylbenzene    | 45              | 10       | 0.050   | 0.053    | 0.111    | 0.170    | 0.205    | 0.205    | 0.205    |   | 0.261 | 0.050 | 0.117 | 0.061    |
| 1,2-Dichlorobenzene       | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 1,2-Dichloroethane        | 45              | 42       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.090 | 0.050 | 0.051 | 0.006    |
| 1,2-Dichloropropane       | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 1,2-Dichlorobenzene       | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 1,3,5-Trimethylbenzene    | 45              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.073    | 0.073    | 0.073    |   | 0.088 | 0.050 | 0.054 | 0.010    |
| 1,3-Butadiene             | 45              | 43       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.127 | 0.050 | 0.053 | 0.013    |
| 1,3-Dichlorobenzene       | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.056 | 0.050 | 0.050 | 0.001    |
| 1,3-Diethylbenzene        | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.051 | 0.050 | 0.050 | 0.000    |
| 1,4-Dichlorobenzene       | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 1,4-Dichlorobutane        | 45              | 42       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.067 | 0.050 | 0.050 | 0.002    |
| 1,4-Diethylbenzene        | 45              | 41       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.114 | 0.050 | 0.052 | 0.010    |
| 1-Butene/Isobutene        | 45              | 0        | 0.080   | 0.099    | 0.151    | 0.170    | 0.210    | 0.210    | 0.210    |   | 0.328 | 0.061 | 0.145 | 0.054    |
| 1-Butyne                  | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 1-Decene                  | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 1-Heptene                 | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.050 | 0.050 | 0.050 | 0.000    |
| 1-Hexene                  | 45              | 43       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.219 | 0.050 | 0.056 | 0.028    |
| 1-Methylcyclohexene       | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.051 | 0.050 | 0.050 | 0.000    |
| 1-Methylcyclopentene      | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.057 | 0.050 | 0.050 | 0.001    |
| 1-Nonene                  | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 1-Octene                  | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 1-Pentene                 | 45              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.063    | 0.063    | 0.063    |   | 0.138 | 0.050 | 0.054 | 0.014    |
| 1-Propyne                 | 45              | 45       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    |   | 0.054 | 0.050 | 0.050 | 0.001    |
| 1-Undecene                | 45              | 21       | 0.050   | 0.050    | 0.074    | 0.155    | 0.426    | 0.426    | 0.426    |   | 0.964 | 0.050 | 0.160 | 0.204    |
| 2,2,3-Trimethylbutane     | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 2,2,4-Trimethylpentane    | 45              | 4        | 0.050   | 0.102    | 0.142    | 0.188    | 0.221    | 0.221    | 0.221    |   | 0.255 | 0.050 | 0.145 | 0.057    |
| 2,2,5-Trimethylhexane     | 45              | 4        |         |          |          |          |          |          |          |   |       |       |       |          |
| 2,2-Dimethylbutane        | 45              | 27       | 0.050   | 0.050    | 0.050    | 0.060    | 0.076    | 0.076    | 0.076    |   | 0.133 | 0.050 | 0.058 | 0.016    |
| 2,2-Dimethylhexane        | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| 2,2-Dimethylpentane       | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |

**Table 24: VOC Annual Statistics at Simcoe (2003)**

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds                    | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | C<br>75% | N<br>90% | T<br>95% | L<br>99% | E<br>99.5% | S<br>99.9% | Max   | Min   | Mean  | Std.Dev. |
|------------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|----------|------------|------------|-------|-------|-------|----------|
| 2,2-Dimethylpropane          | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050      | 0.050      | 0.097 | 0.050 | 0.051 | 0.007    |
| 2,3,4-Trimethylpentane       | 45              | 23       | 0.050   | 0.050    | 0.050    | 0.061    | 0.079    | 0.089    | 0.089    | 0.089      | 0.089      | 0.152 | 0.050 | 0.058 | 0.012    |
| 2,3-Dimethylbutane           | 45              | 11       | 0.050   | 0.055    | 0.072    | 0.092    | 0.117    | 0.152    | 0.152    | 0.152      | 0.152      | 0.152 | 0.050 | 0.079 | 0.027    |
| 2,3-Dimethylpentane          | 45              | 14       | 0.050   | 0.050    | 0.058    | 0.074    | 0.092    | 0.113    | 0.113    | 0.113      | 0.113      | 0.113 | 0.050 | 0.065 | 0.018    |
| 2,4-Dimethylhexane           | 45              | 45       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| 2,4-Dimethylpentane          | 45              | 38       | 0.050   | 0.050    | 0.050    | 0.050    | 0.057    | 0.084    | 0.084    | 0.084      | 0.084      | 0.084 | 0.050 | 0.052 | 0.006    |
| 2,5-Dimethylbenzaldehyde     | 29              | 29       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| 2,5-Dimethylhexane           | 45              | 45       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| 2-Ethyl-1-butene             | 45              | 45       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| 2-Ethyltoluene               | 45              | 36       | 0.050   | 0.050    | 0.050    | 0.050    | 0.067    | 0.084    | 0.084    | 0.084      | 0.084      | 0.084 | 0.050 | 0.053 | 0.007    |
| 2-methyl-1-butene            | 43              | 40       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.062    | 0.062    | 0.062      | 0.062      | 0.062 | 0.050 | 0.051 | 0.002    |
| 2-Methyl-2-butene            | 45              | 45       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| 2-Methylpentane              | 45              | 31       | 0.050   | 0.050    | 0.050    | 0.053    | 0.060    | 0.081    | 0.081    | 0.081      | 0.081      | 0.081 | 0.050 | 0.053 | 0.007    |
| 2-Methylhexane               | 45              | 3        | 0.050   | 0.081    | 0.110    | 0.131    | 0.176    | 0.250    | 0.250    | 0.250      | 0.250      | 0.250 | 0.050 | 0.115 | 0.046    |
| 2-Methylpentane              | 45              | 0        | 0.096   | 0.170    | 0.281    | 0.351    | 0.440    | 0.594    | 0.594    | 0.594      | 0.594      | 0.594 | 0.080 | 0.280 | 0.131    |
| 2-Pentanone/Isovaleraldehyde | 29              | 7        | 0.050   | 0.053    | 0.072    | 0.104    | 0.166    | 0.197    | 0.197    | 0.197      | 0.197      | 0.197 | 0.050 | 0.086 | 0.043    |
| 3,6-Dimethyloctane           | 45              | 45       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| 3-Ethyltoluene               | 45              | 13       | 0.050   | 0.050    | 0.075    | 0.111    | 0.147    | 0.179    | 0.179    | 0.179      | 0.179      | 0.179 | 0.050 | 0.085 | 0.040    |
| 3-Methyl-1-Butene            | 45              | 45       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| 3-Methyl-1-pentene           | 45              | 45       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| 3-Methylheptane              | 45              | 42       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.107    | 0.107    | 0.107      | 0.107      | 0.107 | 0.050 | 0.052 | 0.009    |
| 3-Methylhexane               | 45              | 4        | 0.050   | 0.082    | 0.116    | 0.144    | 0.189    | 0.244    | 0.244    | 0.244      | 0.244      | 0.244 | 0.050 | 0.117 | 0.049    |
| 3-Methylpentane              | 45              | 0        | 0.081   | 0.137    | 0.204    | 0.251    | 0.322    | 0.473    | 0.473    | 0.473      | 0.473      | 0.473 | 0.059 | 0.208 | 0.093    |
| 4-Ethyltoluene               | 45              | 31       | 0.050   | 0.050    | 0.050    | 0.059    | 0.083    | 0.108    | 0.108    | 0.108      | 0.108      | 0.108 | 0.050 | 0.057 | 0.014    |
| 4-Methyl-1-pentene           | 45              | 45       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| 4-Methylheptane              | 45              | 45       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| Acetaldehyde                 | 29              | 0        | 0.396   | 0.648    | 0.874    | 1.123    | 1.492    | 3.058    | 3.058    | 3.058      | 3.058      | 3.058 | 0.294 | 0.976 | 0.569    |
| Acetone                      | 29              | 0        | 1.100   | 1.827    | 2.321    | 3.534    | 4.690    | 6.534    | 6.534    | 6.534      | 6.534      | 6.534 | 0.986 | 2.673 | 1.270    |
| Acrylonitrile                | 45              | 0        | 0.275   | 0.390    | 0.513    | 0.698    | 0.948    | 1.353    | 1.353    | 1.353      | 1.353      | 1.353 | 0.208 | 0.576 | 0.257    |
| Acrolein                     | 29              | 23       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050      | 0.050      | 0.050 | 0.050 | 0.055 | 0.014    |
| a-Phenene                    | 43              | 14       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050    | 0.050      | 0.050      | 0.050 | 0.050 | 0.050 | 0.014    |
| Benzaldehyde                 | 29              | 10       | 0.050   | 0.050    | 0.063    | 0.093    | 0.129    | 0.189    | 0.189    | 0.189      | 0.189      | 0.189 | 0.050 | 0.077 | 0.034    |
| Benzene                      | 45              | 0        | 0.293   | 0.421    | 0.508    | 0.696    | 0.890    | 1.080    | 1.080    | 1.080      | 1.080      | 1.080 | 0.163 | 0.566 | 0.217    |
| Benzylchloride               | 45              | 45       |         |          |          |          |          |          |          |            |            |       |       |       |          |
| b-Phenene                    | 43              | 26       | 0.050   | 0.050    | 0.050    | 0.149    | 0.309    | 0.398    | 0.398    | 0.398      | 0.398      | 0.398 | 0.050 | 0.115 | 0.105    |
| Bromodichloromethane         | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.051    | 0.051    | 0.051      | 0.051      | 0.051 | 0.050 | 0.050 | 0.000    |
| Bromoform                    | 45              | 43       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.059    | 0.059    | 0.059      | 0.059      | 0.059 | 0.050 | 0.050 | 0.001    |

**Table 24: VOC Annual Statistics at Simcoe (2003)**

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds                       | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | C<br>75% | N<br>90% | E<br>S | Max    | Min   | Mean  | Std.Dev. |
|---------------------------------|-----------------|----------|---------|----------|----------|----------|----------|--------|--------|-------|-------|----------|
| Bromomethane                    | 45              | 2        | 0.051   | 0.056    | 0.065    | 0.072    | 0.101    |        | 0.199  | 0.050 | 0.071 | 0.027    |
| Butane                          | 45              | 0        | 0.637   | 1.019    | 1.519    | 2.364    | 3.344    |        | 5.422  | 0.513 | 1.765 | 1.017    |
| Camphene                        | 43              | 29       | 0.050   | 0.050    | 0.050    | 0.065    | 0.152    |        | 0.252  | 0.050 | 0.073 | 0.048    |
| Carbon tetrachloride            | 45              | 0        | 0.577   | 0.605    | 0.646    | 0.671    | 0.694    |        | 0.750  | 0.552 | 0.641 | 0.046    |
| Chlorobenzene                   | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| Chloroethane                    | 45              | 42       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |        | 0.109  | 0.050 | 0.052 | 0.010    |
| Chloroform                      | 45              | 0        | 0.063   | 0.073    | 0.079    | 0.089    | 0.098    |        | 0.143  | 0.060 | 0.084 | 0.017    |
| Chloromethane                   | 45              | 0        | 1.058   | 1.136    | 1.268    | 1.558    | 1.736    |        | 1.853  | 0.964 | 1.342 | 0.252    |
| cis-1,2-Dichloroethylene        | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| cis-1,2-Dimethylcyclohexane     | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| cis-1,3-Dichloropropene         | 45              | 37       | 0.050   | 0.050    | 0.050    | 0.050    | 0.148    |        | 0.396  | 0.050 | 0.074 | 0.072    |
| cis-1,3-Dimethylcyclohexane     | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| cis-1,4/1,3-Dimethylcyclohexane | 45              | 45       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |        | 0.069  | 0.050 | 0.051 | 0.004    |
| cis-2-Butene                    | 45              | 43       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |        | 0.058  | 0.050 | 0.050 | 0.001    |
| cis-2-Heptene                   | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |        |        |       |       |          |
| cis-2-Hexene                    | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| cis-2-Pentene                   | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| cis-3-Heptene                   | 41              | 41       |         |          |          |          |          |        |        |       |       |          |
| cis-3-Methyl-2-pentene          | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| cis-4-Methyl-2-pentene          | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| Crotonaldehyde                  | 29              | 27       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |        | 0.058  | 0.050 | 0.050 | 0.002    |
| Cyclohexane                     | 45              | 20       | 0.050   | 0.050    | 0.052    | 0.099    | 0.141    |        | 0.153  | 0.050 | 0.076 | 0.035    |
| Cyclohexene                     | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| Cyclopentane                    | 45              | 13       | 0.050   | 0.050    | 0.062    | 0.077    | 0.101    |        | 0.123  | 0.050 | 0.068 | 0.020    |
| Cyclopentene                    | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| Decane                          | 45              | 23       | 0.050   | 0.050    | 0.050    | 0.081    | 0.097    |        | 0.103  | 0.050 | 0.063 | 0.019    |
| Dibromochloromethane            | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |        | 0.059  | 0.050 | 0.050 | 0.001    |
| Dibromomethane                  | 45              | 43       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |        | 0.105  | 0.050 | 0.052 | 0.010    |
| Dichloromethane                 | 45              | 0        | 0.174   | 0.203    | 0.220    | 0.249    | 0.309    |        | 0.796  | 0.164 | 0.251 | 0.123    |
| d-Limonene                      | 43              | 31       | 0.050   | 0.050    | 0.050    | 0.052    | 0.138    |        | 0.187  | 0.050 | 0.069 | 0.039    |
| Dodecane                        | 45              | 28       | 0.050   | 0.050    | 0.050    | 0.057    | 0.114    |        | 0.114  | 0.050 | 0.057 | 0.013    |
| EDH                             | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |        | 0.066  | 0.050 | 0.050 | 0.002    |
| ETHANE                          | 45              | 0        | 1.921   | 2.284    | 3.029    | 4.011    | 5.327    |        | 10.976 | 1.490 | 3.560 | 1.908    |
| Ethylbenzene                    | 45              | 2        | 0.057   | 0.098    | 0.144    | 0.171    | 0.211    |        | 0.311  | 0.050 | 0.144 | 0.062    |
| Ethylbromide                    | 45              | 45       |         |          |          |          |          |        |        |       |       |          |
| Ethylene                        | 45              | 0        | 0.396   | 0.564    | 0.755    | 1.063    | 1.309    |        | 1.670  | 0.344 | 0.836 | 0.333    |
| Formaldehyde                    | 29              | 0        | 0.341   | 1.032    | 1.671    | 3.234    | 4.347    |        | 8.260  | 0.338 | 2.153 | 1.688    |

Table 24: VOC Annual Statistics at Simcoe (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds           | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | C<br>75% | N<br>90% | L<br>95% | E<br>99% | S | Max   | Min   | Mean  | Std.Dev. |
|---------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|----------|---|-------|-------|-------|----------|
| Freon11             | 45              | 0        | 1.614   | 1.677    | 1.743    | 1.861    | 1.917    |          |          |   | 2.081 | 1.559 | 1.770 | 0.124    |
| Freon113            | 45              | 0        | 0.565   | 0.602    | 0.647    | 0.677    | 0.720    |          |          |   | 0.810 | 0.529 | 0.643 | 0.057    |
| Freon114            | 45              | 0        | 0.109   | 0.112    | 0.116    | 0.119    | 0.126    |          |          |   | 0.129 | 0.108 | 0.121 | 0.020    |
| Freon12             | 45              | 0        | 2.522   | 2.601    | 2.708    | 2.807    | 2.857    |          |          |   | 3.252 | 2.486 | 2.722 | 0.161    |
| Freon22             | 45              | 0        | 0.543   | 0.575    | 0.607    | 0.638    | 0.674    |          |          |   | 0.795 | 0.532 | 0.617 | 0.057    |
| Heptane             | 45              | 8        | 0.050   | 0.058    | 0.083    | 0.121    | 0.144    |          |          |   | 0.207 | 0.050 | 0.093 | 0.040    |
| Hexachlorobutadiene | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| Hexanal             | 29              | 13       | 0.050   | 0.050    | 0.067    | 0.149    | 0.308    |          |          |   | 0.382 | 0.050 | 0.123 | 0.104    |
| Hexane              | 45              | 0        | 0.097   | 0.161    | 0.240    | 0.342    | 0.426    |          |          |   | 1.395 | 0.080 | 0.282 | 0.206    |
| Hexylbenzene        | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          |          |   | 0.102 | 0.050 | 0.051 | 0.008    |
| Indane              | 45              | 44       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    |          |          |   | 0.060 | 0.050 | 0.050 | 0.001    |
| Isobutane           | 45              | 0        | 0.226   | 0.397    | 0.605    | 0.804    | 1.117    |          |          |   | 1.515 | 0.152 | 0.652 | 0.330    |
| iso-Butylbenzene    | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| Isopentane          | 45              | 0        | 0.468   | 0.850    | 1.102    | 1.272    | 1.590    |          |          |   | 2.215 | 0.311 | 1.089 | 0.436    |
| Isoprene            | 45              | 28       | 0.050   | 0.050    | 0.050    | 0.302    | 0.628    |          |          |   | 1.166 | 0.050 | 0.203 | 0.264    |
| iso-Propylbenzene   | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| m and p-Xylene      | 45              | 2        | 0.076   | 0.193    | 0.292    | 0.397    | 0.585    |          |          |   | 0.832 | 0.050 | 0.327 | 0.185    |
| MEK                 | 29              | 0        | 0.140   | 0.357    | 0.396    | 0.577    | 1.487    |          |          |   | 3.091 | 0.133 | 0.614 | 0.624    |
| Methylcyclohexane   | 45              | 24       | 0.050   | 0.050    | 0.050    | 0.070    | 0.087    |          |          |   | 0.120 | 0.050 | 0.061 | 0.018    |
| Methylcyclopentane  | 45              | 5        | 0.050   | 0.068    | 0.111    | 0.134    | 0.173    |          |          |   | 0.695 | 0.050 | 0.122 | 0.099    |
| MIBK                | 29              | 20       | 0.050   | 0.050    | 0.050    | 0.058    | 0.071    |          |          |   | 0.088 | 0.050 | 0.056 | 0.011    |
| MTBE                | 43              | 43       |         |          |          |          |          |          |          |   |       |       |       |          |
| m-Tolualdehyde      | 29              | 29       |         |          |          |          |          |          |          |   |       |       |       |          |
| Naphthalene         | 45              | 13       | 0.050   | 0.050    | 0.060    | 0.078    | 0.149    |          |          |   | 0.328 | 0.050 | 0.081 | 0.053    |
| n-Butylbenzene      | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |
| Nonane              | 45              | 32       | 0.050   | 0.050    | 0.050    | 0.053    | 0.063    |          |          |   | 0.080 | 0.050 | 0.054 | 0.008    |
| n-Propylbenzene     | 45              | 36       | 0.050   | 0.050    | 0.050    | 0.050    | 0.061    |          |          |   | 0.076 | 0.050 | 0.052 | 0.006    |
| Octane              | 45              | 27       | 0.050   | 0.050    | 0.050    | 0.059    | 0.073    |          |          |   | 0.102 | 0.050 | 0.056 | 0.011    |
| o-Tolualdehyde      | 29              | 29       |         |          |          |          |          |          |          |   |       |       |       |          |
| o-Xylene            | 45              | 4        | 0.050   | 0.080    | 0.117    | 0.152    | 0.183    |          |          |   | 0.286 | 0.050 | 0.121 | 0.055    |
| p-Cymene            | 45              | 37       | 0.050   | 0.050    | 0.050    | 0.050    | 0.075    |          |          |   | 0.102 | 0.050 | 0.055 | 0.012    |
| Pentane             | 45              | 0        | 0.263   | 0.527    | 0.636    | 0.797    | 1.020    |          |          |   | 1.353 | 0.216 | 0.651 | 0.260    |
| Propane             | 45              | 0        | 1.278   | 1.698    | 2.363    | 3.177    | 4.341    |          |          |   | 6.783 | 0.497 | 2.631 | 1.373    |
| Propionaldehyde     | 29              | 0        | 0.086   | 0.141    | 0.200    | 0.277    | 0.364    |          |          |   | 0.705 | 0.056 | 0.222 | 0.131    |
| Propylene           | 45              | 0        | 0.116   | 0.197    | 0.220    | 0.312    | 0.383    |          |          |   | 0.631 | 0.077 | 0.252 | 0.108    |
| p-Tolualdehyde      | 29              | 29       |         |          |          |          |          |          |          |   |       |       |       |          |
| sec-Butylbenzene    | 45              | 45       |         |          |          |          |          |          |          |   |       |       |       |          |

**Table 24: VOC Annual Statistics at Simcoe (2003)**  
Unit: micrograms per cubic metre (µg/m³)

| Compounds                     | # of<br>Samples | No. < DL | P<br>5% | E<br>25% | R<br>50% | N<br>75% | T<br>90% | L<br>95% | S<br>99% | Max   | Min   | Mean  | Std.Dev. |
|-------------------------------|-----------------|----------|---------|----------|----------|----------|----------|----------|----------|-------|-------|-------|----------|
| Styrene                       | 45              | 40       | 0.050   | 0.050    | 0.050    | 0.050    | 0.052    |          |          | 0.093 | 0.050 | 0.082 | 0.007    |
| tert-Butylbenzene             | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| Tetrachloroethylene           | 45              | 7        | 0.050   | 0.056    | 0.073    | 0.093    | 0.119    |          |          | 0.198 | 0.050 | 0.081 | 0.030    |
| Toluene                       | 45              | 0        | 0.340   | 0.639    | 0.821    | 0.944    | 1.318    |          |          | 1.817 | 0.189 | 0.853 | 0.354    |
| trans-1,2-Dichloroethylene    | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| trans-1,2-Dimethylcyclohexane | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| trans-1,3-Dichloropropene     | 45              | 37       | 0.050   | 0.050    | 0.050    | 0.050    | 0.154    |          |          | 0.256 | 0.050 | 0.067 | 0.046    |
| trans-1,4-Dimethylcyclohexane | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| trans-2-Butene                | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| trans-2-Heptene               | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| trans-2-Hexene                | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| trans-2-Octene                | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| trans-2-Pentene               | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| trans-3-Heptene               | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| trans-3-Methyl-2-pentene      | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| trans-4-Methyl-2-pentene      | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |
| Trichloroethylene             | 45              | 33       | 0.050   | 0.050    | 0.050    | 0.051    | 0.095    |          |          | 0.142 | 0.050 | 0.060 | 0.023    |
| Undecane                      | 45              | 16       | 0.050   | 0.050    | 0.055    | 0.066    | 0.095    |          |          | 0.120 | 0.050 | 0.064 | 0.019    |
| Valeraldehyde                 | 29              | 17       | 0.050   | 0.050    | 0.050    | 0.080    | 0.096    |          |          | 0.136 | 0.050 | 0.066 | 0.024    |
| Vinylchloride                 | 45              | 45       |         |          |          |          |          |          |          |       |       |       |          |



**Table 25: VOC Annual Statistics at Stouffville (2003)**

Unit: micrograms per cubic metre (µg/m³)

| Compounds                 | # of<br>Samples | No. < DL | 5%    | P     | E     | R     | C     | E     | N     | T     | I     | L | E | S | Max   | Min   | Mean  | Std.Dev. |
|---------------------------|-----------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|---|---|-------|-------|-------|----------|
| 1,1,1,1-tetrachloroethane | 48              | 0        | 0.149 | 0.157 | 0.164 | 0.182 | 0.208 | 0.262 | 0.144 | 0.172 | 0.025 |   |   |   | 0.262 | 0.144 | 0.172 | 0.025    |
| 1,1,1,2-tetrachloroethane | 48              | 45       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.065 | 0.050 | 0.050 | 0.002 |   |   |   | 0.065 | 0.050 | 0.050 | 0.002    |
| 1,1,2-trichloroethane     | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.075 | 0.050 | 0.051 | 0.004 |   |   |   | 0.075 | 0.050 | 0.051 | 0.004    |
| 1,1-dichloroethane        | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| 1,1,1-dichloroethylene    | 48              | 45       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.093 | 0.050 | 0.052 | 0.008 |   |   |   | 0.093 | 0.050 | 0.052 | 0.008    |
| 1,2,3-trimethylbenzene    | 48              | 24       | 0.050 | 0.050 | 0.051 | 0.071 | 0.094 | 0.278 | 0.050 | 0.068 | 0.039 |   |   |   | 0.278 | 0.050 | 0.068 | 0.039    |
| 1,2,4-trichlorobenzene    | 48              | 45       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.094 | 0.050 | 0.052 | 0.007 |   |   |   | 0.094 | 0.050 | 0.052 | 0.007    |
| 1,2,4-trimethylbenzene    | 48              | 4        | 0.050 | 0.127 | 0.232 | 0.322 | 0.401 | 0.986 | 0.050 | 0.245 | 0.183 |   |   |   | 0.986 | 0.050 | 0.245 | 0.183    |
| 1,2-dichlorobenzene       | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.064 | 0.050 | 0.050 | 0.002 |   |   |   | 0.064 | 0.050 | 0.050 | 0.002    |
| 1,2-dichloroethane        | 48              | 42       | 0.050 | 0.050 | 0.050 | 0.050 | 0.053 | 0.110 | 0.050 | 0.054 | 0.014 |   |   |   | 0.110 | 0.050 | 0.054 | 0.014    |
| 1,2-dichloropropane       | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.062 | 0.050 | 0.050 | 0.002 |   |   |   | 0.062 | 0.050 | 0.050 | 0.002    |
| 1,2-diethylbenzene        | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| 1,3,5-trimethylbenzene    | 48              | 19       | 0.050 | 0.050 | 0.064 | 0.092 | 0.115 | 0.262 | 0.050 | 0.078 | 0.044 |   |   |   | 0.262 | 0.050 | 0.078 | 0.044    |
| 1,3-butadiene             | 48              | 31       | 0.050 | 0.050 | 0.050 | 0.063 | 0.121 | 0.177 | 0.050 | 0.064 | 0.029 |   |   |   | 0.177 | 0.050 | 0.064 | 0.029    |
| 1,3-dichlorobenzene       | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.066 | 0.050 | 0.050 | 0.002 |   |   |   | 0.066 | 0.050 | 0.050 | 0.002    |
| 1,3-diethylbenzene        | 48              | 45       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.079 | 0.050 | 0.051 | 0.004 |   |   |   | 0.079 | 0.050 | 0.051 | 0.004    |
| 1,4-dichlorobenzene       | 48              | 30       | 0.050 | 0.050 | 0.050 | 0.070 | 0.081 | 0.130 | 0.050 | 0.060 | 0.016 |   |   |   | 0.130 | 0.050 | 0.060 | 0.016    |
| 1,4-dichlorobutane        | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| 1,4-diethylbenzene        | 48              | 30       | 0.050 | 0.050 | 0.050 | 0.076 | 0.111 | 0.323 | 0.050 | 0.068 | 0.044 |   |   |   | 0.323 | 0.050 | 0.068 | 0.044    |
| 1-butene/isobutene        | 48              | 0        | 0.083 | 0.182 | 0.251 | 0.347 | 0.446 | 2.159 | 0.060 | 0.315 | 0.315 |   |   |   | 2.159 | 0.060 | 0.315 | 0.315    |
| 1-butyne                  | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| 1-decene                  | 48              | 45       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.100 | 0.050 | 0.052 | 0.010 |   |   |   | 0.100 | 0.050 | 0.052 | 0.010    |
| 1-heptene                 | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| 1-hexene                  | 48              | 40       | 0.050 | 0.050 | 0.050 | 0.050 | 0.116 | 0.313 | 0.050 | 0.066 | 0.046 |   |   |   | 0.313 | 0.050 | 0.066 | 0.046    |
| 1-methylcyclohexene       | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| 1-methylcyclopentene      | 48              | 43       | 0.050 | 0.050 | 0.050 | 0.050 | 0.056 | 0.149 | 0.050 | 0.053 | 0.014 |   |   |   | 0.149 | 0.050 | 0.053 | 0.014    |
| 1-nonene                  | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.062 | 0.050 | 0.050 | 0.002 |   |   |   | 0.062 | 0.050 | 0.050 | 0.002    |
| 1-octene                  | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.056 | 0.050 | 0.050 | 0.001 |   |   |   | 0.056 | 0.050 | 0.050 | 0.001    |
| 1-pentene                 | 48              | 24       | 0.050 | 0.050 | 0.051 | 0.071 | 0.115 | 0.803 | 0.050 | 0.083 | 0.111 |   |   |   | 0.803 | 0.050 | 0.083 | 0.111    |
| 1-propyne                 | 48              | 39       | 0.050 | 0.050 | 0.050 | 0.050 | 0.074 | 0.116 | 0.050 | 0.054 | 0.012 |   |   |   | 0.116 | 0.050 | 0.054 | 0.012    |
| 1-undecene                | 48              | 23       | 0.050 | 0.050 | 0.087 | 0.525 | 0.817 | 1.921 | 0.050 | 0.325 | 0.457 |   |   |   | 1.921 | 0.050 | 0.325 | 0.457    |
| 2,2,3-trimethylbutane     | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| 2,2,4-trimethylpentane    | 48              | 1        | 0.073 | 0.143 | 0.203 | 0.349 | 0.455 | 0.934 | 0.050 | 0.250 | 0.176 |   |   |   | 0.934 | 0.050 | 0.250 | 0.176    |
| 2,2,5-trimethylhexane     | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.061 | 0.050 | 0.050 | 0.002 |   |   |   | 0.061 | 0.050 | 0.050 | 0.002    |
| 2,2,5-trimethylhexane     | 48              | 18       | 0.050 | 0.050 | 0.057 | 0.086 | 0.124 | 0.886 | 0.050 | 0.086 | 0.121 |   |   |   | 0.886 | 0.050 | 0.086 | 0.121    |
| 2,2-dimethylbutane        | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.069 | 0.050 | 0.051 | 0.003 |   |   |   | 0.069 | 0.050 | 0.051 | 0.003    |
| 2,2-dimethylhexane        | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.098 | 0.050 | 0.051 | 0.007 |   |   |   | 0.098 | 0.050 | 0.051 | 0.007    |
| 2,2-dimethylpentane       | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.098 | 0.050 | 0.051 | 0.007 |   |   |   | 0.098 | 0.050 | 0.051 | 0.007    |

Table 25: VOC Annual Statistics at Stouffville (2003)

Unit: micrograms per cubic metre (µg/m³)

| Compounds              | # of<br>Samples | No. < DL | P     | E     | R     | C     | N     | T | I | L | E | S | Max    | Min   | Mean  | Std.Dev. |
|------------------------|-----------------|----------|-------|-------|-------|-------|-------|---|---|---|---|---|--------|-------|-------|----------|
|                        |                 |          | 5%    | 25%   | 50%   | 75%   | 90%   |   |   |   |   |   |        |       |       |          |
| 2,2-Dimethylpropane    | 48              | 44       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   | 0.107  | 0.050 | 0.052 | 0.009    |
| 2,3,4-Trimethylpentane | 48              | 10       | 0.050 | 0.055 | 0.065 | 0.112 | 0.151 |   |   |   |   |   | 0.358  | 0.050 | 0.089 | 0.059    |
| 2,3-Dimethylbutane     | 48              | 4        | 0.050 | 0.092 | 0.114 | 0.149 | 0.220 |   |   |   |   |   | 1.544  | 0.050 | 0.156 | 0.215    |
| 2,3-Dimethylpentane    | 48              | 4        | 0.050 | 0.079 | 0.105 | 0.161 | 0.207 |   |   |   |   |   | 0.467  | 0.050 | 0.125 | 0.078    |
| 2,4-Dimethylhexane     | 48              | 34       | 0.050 | 0.050 | 0.050 | 0.060 | 0.086 |   |   |   |   |   | 0.154  | 0.050 | 0.060 | 0.021    |
| 2,4-Dimethylpentane    | 48              | 22       | 0.050 | 0.050 | 0.054 | 0.078 | 0.103 |   |   |   |   |   | 0.338  | 0.050 | 0.070 | 0.047    |
| 2,5-Dimethylhexane     | 48              | 36       | 0.050 | 0.050 | 0.050 | 0.053 | 0.083 |   |   |   |   |   | 0.134  | 0.050 | 0.057 | 0.016    |
| 2-Ethyl-1-butene       | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   | 0.078  | 0.050 | 0.051 | 0.004    |
| 2-Ethyltoluene         | 48              | 20       | 0.050 | 0.050 | 0.062 | 0.087 | 0.101 |   |   |   |   |   | 0.224  | 0.050 | 0.073 | 0.037    |
| 2-methyl-1-butene      | 48              | 20       | 0.050 | 0.050 | 0.060 | 0.089 | 0.176 |   |   |   |   |   | 1.653  | 0.050 | 0.116 | 0.236    |
| 2-Methyl-2-butene      | 47              | 21       | 0.050 | 0.050 | 0.060 | 0.084 | 0.132 |   |   |   |   |   | 3.139  | 0.050 | 0.145 | 0.448    |
| 2-Methylheptane        | 48              | 20       | 0.050 | 0.050 | 0.056 | 0.102 | 0.176 |   |   |   |   |   | 0.227  | 0.050 | 0.089 | 0.049    |
| 2-Methylhexane         | 48              | 12       | 0.050 | 0.051 | 0.077 | 0.121 | 0.291 |   |   |   |   |   | 1.042  | 0.066 | 0.255 | 0.163    |
| 2-Methylpentane        | 48              | 0        | 0.092 | 0.165 | 0.211 | 0.582 | 0.850 |   |   |   |   |   | 5.926  | 0.110 | 0.596 | 0.839    |
| 3,6-Dimethyloctane     | 48              | 0        | 0.133 | 0.330 | 0.456 | 0.500 | 0.500 |   |   |   |   |   | 0.092  | 0.050 | 0.051 | 0.006    |
| 3-Ethyltoluene         | 48              | 6        | 0.050 | 0.079 | 0.148 | 0.198 | 0.246 |   |   |   |   |   | 0.576  | 0.050 | 0.151 | 0.103    |
| 3-Methyl-1-Butene      | 48              | 44       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   | 0.352  | 0.050 | 0.058 | 0.044    |
| 3-Methyl-1-pentene     | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   | 0.074  | 0.050 | 0.051 | 0.003    |
| 3-Methylheptane        | 48              | 11       | 0.050 | 0.052 | 0.068 | 0.097 | 0.173 |   |   |   |   |   | 0.258  | 0.050 | 0.087 | 0.051    |
| 3-Methylhexane         | 48              | 0        | 0.081 | 0.174 | 0.223 | 0.319 | 0.459 |   |   |   |   |   | 1.104  | 0.063 | 0.275 | 0.185    |
| 3-Methylpentane        | 48              | 0        | 0.119 | 0.266 | 0.338 | 0.422 | 0.695 |   |   |   |   |   | 3.424  | 0.095 | 0.431 | 0.482    |
| 4-Ethyltoluene         | 48              | 19       | 0.050 | 0.050 | 0.070 | 0.099 | 0.136 |   |   |   |   |   | 0.278  | 0.050 | 0.083 | 0.047    |
| 4-Methyl-1-pentene     | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   | 0.055  | 0.050 | 0.050 | 0.001    |
| 4-Methylheptane        | 48              | 40       | 0.050 | 0.050 | 0.050 | 0.050 | 0.070 |   |   |   |   |   | 0.092  | 0.050 | 0.054 | 0.010    |
| Acetylene              | 47              | 0        | 0.331 | 0.501 | 0.675 | 1.044 | 1.402 |   |   |   |   |   | 1.975  | 0.213 | 0.823 | 0.424    |
| a-Propene              | 45              | 10       | 0.050 | 0.058 | 0.133 | 0.299 | 0.353 |   |   |   |   |   | 0.726  | 0.050 | 0.190 | 0.168    |
| Benzene                | 48              | 0        | 0.333 | 0.520 | 0.685 | 0.814 | 1.185 |   |   |   |   |   | 1.778  | 0.246 | 0.700 | 0.303    |
| Benzylethloride        | 48              | 48       | 0.050 | 0.050 | 0.050 | 0.076 | 0.119 |   |   |   |   |   | 0.261  | 0.050 | 0.071 | 0.042    |
| b-Propene              | 45              | 25       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   | 0.067  | 0.050 | 0.050 | 0.003    |
| Bromodichloromethane   | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   | 0.076  | 0.050 | 0.051 | 0.004    |
| Bromoforn              | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   | 0.105  | 0.050 | 0.070 | 0.032    |
| Bromomethane           | 48              | 2        | 0.051 | 0.055 | 0.059 | 0.071 | 0.105 |   |   |   |   |   | 0.231  | 0.050 | 0.050 | 0.001    |
| Butane                 | 48              | 0        | 0.691 | 1.321 | 2.070 | 4.340 | 7.347 |   |   |   |   |   | 23.035 | 0.411 | 3.582 | 4.271    |
| Camphene               | 45              | 43       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   | 0.059  | 0.050 | 0.050 | 0.001    |
| Carbonetrachloride     | 48              | 0        | 0.554 | 0.620 | 0.644 | 0.677 | 0.698 |   |   |   |   |   | 0.762  | 0.536 | 0.646 | 0.048    |
| Chlorobenzene          | 48              | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   | 0.122  | 0.050 | 0.052 | 0.011    |
| Chloroethane           | 48              | 45       |       |       |       |       |       |   |   |   |   |   |        |       |       |          |

**Table 25: VOC Annual Statistics at Stouffville (2003)**

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds                        | # of<br>Samples | No. < DL | 5%    | P     | E     | R     | C     | E     | N     | T     | I     | L | E | S | Max   | Min   | Mean  | Std.Dev. |
|----------------------------------|-----------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|---|---|-------|-------|-------|----------|
| Chloroform                       | 48              | 0        | 0.070 | 0.080 | 0.087 | 0.113 | 0.129 | 0.175 | 0.058 | 0.095 | 0.023 |   |   |   | 0.175 | 0.058 | 0.095 | 0.023    |
| Chloromethane                    | 48              | 0        | 0.999 | 1.073 | 1.164 | 1.428 | 1.554 | 1.745 | 0.972 | 1.232 | 0.209 |   |   |   | 1.745 | 0.972 | 1.232 | 0.209    |
| cis-1,2-Dichloroethylene         | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| cis-1,2-Dimethylcyclohexane      | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| cis-1,3-Dichloropropene          | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| cis-1,3-Dimethylcyclohexane      | 48              | 30       | 0.050 | 0.050 | 0.050 | 0.062 | 0.103 | 0.209 | 0.050 | 0.063 | 0.029 |   |   |   | 0.209 | 0.050 | 0.063 | 0.029    |
| cis-1,4-/1,3-Dimethylcyclohexane | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.068 | 0.050 | 0.050 | 0.003 |   |   |   | 0.068 | 0.050 | 0.050 | 0.003    |
| cis-2-Butene                     | 48              | 26       | 0.050 | 0.050 | 0.050 | 0.080 | 0.144 | 1.776 | 0.050 | 0.110 | 0.253 |   |   |   | 1.776 | 0.050 | 0.110 | 0.253    |
| cis-2-Heptene                    | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.083 | 0.050 | 0.051 | 0.005 |   |   |   | 0.083 | 0.050 | 0.051 | 0.005    |
| cis-2-Hexene                     | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.116 | 0.050 | 0.051 | 0.010 |   |   |   | 0.116 | 0.050 | 0.051 | 0.010    |
| cis-2-Pentene                    | 48              | 40       | 0.050 | 0.050 | 0.050 | 0.050 | 0.074 | 1.112 | 0.050 | 0.079 | 0.154 |   |   |   | 1.112 | 0.050 | 0.079 | 0.154    |
| cis-3-Heptene                    | 44              | 41       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.199 | 0.050 | 0.055 | 0.024 |   |   |   | 0.199 | 0.050 | 0.055 | 0.024    |
| cis-3-Methyl-2-pentene           | 48              | 42       | 0.050 | 0.050 | 0.050 | 0.050 | 0.072 | 0.289 | 0.050 | 0.058 | 0.035 |   |   |   | 0.289 | 0.050 | 0.058 | 0.035    |
| cis-4-Methyl-2-pentene           | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.200 | 0.050 | 0.053 | 0.022 |   |   |   | 0.200 | 0.050 | 0.053 | 0.022    |
| Cyclohexane                      | 48              | 7        | 0.050 | 0.064 | 0.093 | 0.121 | 0.160 | 0.526 | 0.050 | 0.105 | 0.076 |   |   |   | 0.526 | 0.050 | 0.105 | 0.076    |
| Cyclohexene                      | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| Cyclopentane                     | 48              | 5        | 0.050 | 0.068 | 0.098 | 0.149 | 0.205 | 1.447 | 0.050 | 0.138 | 0.202 |   |   |   | 1.447 | 0.050 | 0.138 | 0.202    |
| Cyclopentene                     | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.221 | 0.050 | 0.054 | 0.025 |   |   |   | 0.221 | 0.050 | 0.054 | 0.025    |
| Decane                           | 48              | 10       | 0.050 | 0.062 | 0.112 | 0.170 | 0.255 | 1.044 | 0.050 | 0.141 | 0.152 |   |   |   | 1.044 | 0.050 | 0.141 | 0.152    |
| Dibromochloromethane             | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.056 | 0.050 | 0.050 | 0.001 |   |   |   | 0.056 | 0.050 | 0.050 | 0.001    |
| Dibromomethane                   | 48              | 45       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.152 | 0.050 | 0.055 | 0.021 |   |   |   | 0.152 | 0.050 | 0.055 | 0.021    |
| Dichloromethane                  | 48              | 0        | 0.189 | 0.261 | 0.359 | 0.459 | 0.625 | 0.957 | 0.174 | 0.379 | 0.166 |   |   |   | 0.957 | 0.174 | 0.379 | 0.166    |
| d-Limonene                       | 45              | 31       | 0.050 | 0.050 | 0.050 | 0.062 | 0.077 | 0.201 | 0.050 | 0.060 | 0.025 |   |   |   | 0.201 | 0.050 | 0.060 | 0.025    |
| Dodecane                         | 48              | 11       | 0.050 | 0.057 | 0.099 | 0.137 | 0.211 | 2.563 | 0.050 | 0.157 | 0.359 |   |   |   | 2.563 | 0.050 | 0.157 | 0.359    |
| EDB                              | 48              | 45       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.080 | 0.050 | 0.051 | 0.006 |   |   |   | 0.080 | 0.050 | 0.051 | 0.006    |
| Ethane                           | 47              | 0        | 1.432 | 2.026 | 2.703 | 3.653 | 5.203 | 7.378 | 1.410 | 3.084 | 1.496 |   |   |   | 7.378 | 1.410 | 3.084 | 1.496    |
| Ethylbenzene                     | 48              | 0        | 0.112 | 0.211 | 0.298 | 0.439 | 0.583 | 1.000 | 0.072 | 0.330 | 0.178 |   |   |   | 1.000 | 0.072 | 0.330 | 0.178    |
| Ethylbromide                     | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| Ethylene                         | 47              | 0        | 0.408 | 0.818 | 1.159 | 1.638 | 1.960 | 3.159 | 0.389 | 1.263 | 0.580 |   |   |   | 3.159 | 0.389 | 1.263 | 0.580    |
| Freon11                          | 48              | 0        | 1.604 | 1.738 | 1.781 | 1.898 | 1.980 | 2.077 | 1.471 | 1.797 | 0.133 |   |   |   | 2.077 | 1.471 | 1.797 | 0.133    |
| Freon113                         | 48              | 0        | 0.505 | 0.597 | 0.643 | 0.677 | 0.719 | 0.817 | 0.471 | 0.632 | 0.075 |   |   |   | 0.817 | 0.471 | 0.632 | 0.075    |
| Freon114                         | 48              | 0        | 0.103 | 0.112 | 0.115 | 0.120 | 0.123 | 0.262 | 0.100 | 0.122 | 0.033 |   |   |   | 0.262 | 0.100 | 0.122 | 0.033    |
| Freon12                          | 48              | 0        | 2.440 | 2.651 | 2.722 | 2.881 | 3.082 | 3.185 | 2.340 | 2.751 | 0.201 |   |   |   | 3.185 | 2.340 | 2.751 | 0.201    |
| Freon22                          | 48              | 0        | 0.542 | 0.619 | 0.687 | 0.755 | 0.824 | 1.492 | 0.525 | 0.708 | 0.164 |   |   |   | 1.492 | 0.525 | 0.708 | 0.164    |
| Heptane                          | 48              | 1        | 0.065 | 0.134 | 0.173 | 0.284 | 0.406 | 0.768 | 0.050 | 0.220 | 0.143 |   |   |   | 0.768 | 0.050 | 0.220 | 0.143    |
| Hexachlorobutadiene              | 48              | 48       |       |       |       |       |       |       |       |       |       |   |   |   |       |       |       |          |
| Hexane                           | 48              | 0        | 0.128 | 0.278 | 0.382 | 0.527 | 0.916 | 3.105 | 0.094 | 0.487 | 0.458 |   |   |   | 3.105 | 0.094 | 0.487 | 0.458    |

**Table 25: VOC Annual Statistics at Stouffville (2003)**

Unit: micrograms per cubic metre (µg/m³)

| Compounds                     | # of<br>Samples | No. < DL | 5%    | P     | E     | R     | C     | E     | N     | T     | I     | L     | E     | S     | Max    | Min   | Mean  | Std.Dev. |
|-------------------------------|-----------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|----------|
| Hexylbenzene                  | 48              | 46       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.119  | 0.050 | 0.052 | 0.011    |
| Indane                        | 48              | 42       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.066 | 0.050 | 0.134  | 0.050 | 0.054 | 0.014    |
| Isobutane                     | 48              | 0        | 0.264 | 0.516 | 0.772 | 0.772 | 0.772 | 0.772 | 0.772 | 1.260 | 1.260 | 1.260 | 2.208 | 0.203 | 7.940  | 0.203 | 1.096 | 1.213    |
| iso-Butylbenzene              | 48              | 48       | 0.654 | 1.236 | 1.734 | 1.734 | 1.734 | 1.734 | 1.734 | 2.185 | 2.185 | 2.185 | 3.233 | 0.608 | 34.087 | 0.608 | 2.527 | 4.770    |
| Isopentane                    | 48              | 0        | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.815  | 0.050 | 0.139 | 0.169    |
| Isoprene                      | 48              | 27       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.060  | 0.050 | 0.002 | 0.002    |
| iso-Propylbenzene             | 48              | 45       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.002 | 0.002    |
| m and p-Xylene                | 48              | 0        | 0.261 | 0.529 | 0.846 | 0.846 | 0.846 | 0.846 | 0.846 | 1.299 | 1.299 | 1.299 | 1.659 | 0.141 | 2.794  | 0.141 | 0.919 | 0.539    |
| Methylcyclohexane             | 48              | 6        | 0.050 | 0.095 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 | 0.244 | 0.244 | 0.244 | 0.313 | 0.050 | 1.088  | 0.050 | 0.188 | 0.178    |
| Methylcyclohexane             | 48              | 1        | 0.063 | 0.134 | 0.190 | 0.190 | 0.190 | 0.190 | 0.190 | 0.264 | 0.264 | 0.264 | 0.386 | 0.050 | 1.972  | 0.050 | 0.241 | 0.281    |
| Methylcyclopentane            | 48              | 1        | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.066 | 0.037    |
| MTBE                          | 45              | 30       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.621  | 0.050 | 0.120 | 0.097    |
| Naphthalene                   | 48              | 10       | 0.050 | 0.060 | 0.097 | 0.097 | 0.097 | 0.097 | 0.097 | 0.147 | 0.147 | 0.147 | 0.195 | 0.050 | 0.621  | 0.050 | 0.120 | 0.097    |
| n-Butylbenzene                | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.111  | 0.050 | 0.051 | 0.009    |
| n-Butylbenzene                | 48              | 12       | 0.050 | 0.050 | 0.081 | 0.081 | 0.081 | 0.081 | 0.081 | 0.116 | 0.116 | 0.116 | 0.162 | 0.050 | 0.531  | 0.050 | 0.097 | 0.079    |
| Nonane                        | 48              | 20       | 0.050 | 0.050 | 0.058 | 0.058 | 0.058 | 0.058 | 0.058 | 0.080 | 0.080 | 0.080 | 0.100 | 0.050 | 0.206  | 0.050 | 0.070 | 0.032    |
| n-Propylbenzene               | 48              | 11       | 0.050 | 0.051 | 0.086 | 0.086 | 0.086 | 0.086 | 0.086 | 0.113 | 0.113 | 0.113 | 0.190 | 0.050 | 0.325  | 0.050 | 0.100 | 0.065    |
| Octane                        | 48              | 0        | 0.092 | 0.184 | 0.254 | 0.254 | 0.254 | 0.254 | 0.254 | 0.406 | 0.406 | 0.406 | 0.503 | 0.051 | 0.974  | 0.051 | 0.295 | 0.174    |
| o-Xylene                      | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.053  | 0.050 | 0.050 | 0.000    |
| p-Cymene                      | 48              | 0        | 0.366 | 0.746 | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 | 1.388 | 1.388 | 1.388 | 1.900 | 0.331 | 14.399 | 0.331 | 1.375 | 2.012    |
| Pentane                       | 48              | 0        | 1.189 | 1.929 | 2.532 | 2.532 | 2.532 | 2.532 | 2.532 | 4.238 | 4.238 | 4.238 | 5.426 | 0.772 | 71.36  | 0.772 | 2.959 | 1.489    |
| Propane                       | 48              | 0        | 0.152 | 0.250 | 0.375 | 0.375 | 0.375 | 0.375 | 0.375 | 0.478 | 0.478 | 0.478 | 0.694 | 0.115 | 1.491  | 0.115 | 0.406 | 0.233    |
| Propylene                     | 48              | 0        | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.053  | 0.050 | 0.050 | 0.000    |
| sec-Butylbenzene              | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.174  | 0.050 | 0.068 | 0.031    |
| Styrene                       | 48              | 31       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.079 | 0.079 | 0.079 | 0.109 | 0.050 | 0.174  | 0.050 | 0.068 | 0.031    |
| tert-Butylbenzene             | 48              | 48       | 0.061 | 0.083 | 0.156 | 0.156 | 0.156 | 0.156 | 0.156 | 0.184 | 0.184 | 0.184 | 0.244 | 0.050 | 0.650  | 0.050 | 0.157 | 0.112    |
| Tetrachloroethylene           | 48              | 1        | 0.543 | 1.294 | 1.876 | 1.876 | 1.876 | 1.876 | 1.876 | 3.141 | 3.141 | 3.141 | 3.639 | 0.457 | 5.579  | 0.457 | 2.158 | 1.295    |
| Toluene                       | 48              | 0        | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.051 | 0.007    |
| trans-1,2-Dichloroethylene    | 48              | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.098  | 0.050 | 0.051 | 0.007    |
| trans-1,2-Dimethylcyclohexane | 48              | 48       | 0.050 | 0.050 | 0.052 | 0.052 | 0.052 | 0.052 | 0.052 | 0.069 | 0.069 | 0.069 | 0.144 | 0.050 | 2.297  | 0.050 | 0.126 | 0.328    |
| trans-1,3-Dichloropropene     | 48              | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.054 | 0.029    |
| trans-1,4-Dimethylcyclohexane | 48              | 44       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.124  | 0.050 | 0.054 | 0.014    |
| trans-2-Butene                | 48              | 24       | 0.050 | 0.050 | 0.052 | 0.052 | 0.052 | 0.052 | 0.052 | 0.078 | 0.078 | 0.078 | 0.114 | 0.050 | 2.380  | 0.050 | 0.122 | 0.337    |
| trans-2-Heptene               | 48              | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.054 | 0.029    |
| trans-2-Hexene                | 48              | 45       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.054 | 0.014    |
| trans-2-Octene                | 48              | 39       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.054 | 0.014    |
| trans-2-Pentene               | 48              | 22       | 0.050 | 0.050 | 0.052 | 0.052 | 0.052 | 0.052 | 0.052 | 0.078 | 0.078 | 0.078 | 0.114 | 0.050 | 2.380  | 0.050 | 0.122 | 0.337    |
| trans-3-Heptene               | 48              | 48       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050 | 0.051 | 0.010    |
| trans-3-Methyl-2-pentene      | 48              | 47       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.118  | 0.050 | 0.051 | 0.010    |

**Table 25: VOC Annual Statistics at Stouffville (2003)**

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                | # of<br>Samples | No. < DL | P E R C E N T I L E S |       |       |       |       |       |       |       |       |  | Mean | Std.Dev. |
|--------------------------|-----------------|----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|--|------|----------|
|                          |                 |          | 5%                    | 25%   | 50%   | 75%   | 90%   | Max   | Min   |       |       |  |      |          |
| trans-4-Methyl-2-pentene | 48              | 48       |                       |       |       |       |       |       |       |       |       |  |      |          |
| Trichloroethylene        | 48              | 6        | 0.050                 | 0.070 | 0.117 | 0.172 | 0.222 | 0.363 | 0.050 | 0.128 | 0.073 |  |      |          |
| Undecane                 | 48              | 12       | 0.050                 | 0.067 | 0.127 | 0.195 | 0.272 | 1.902 | 0.050 | 0.175 | 0.269 |  |      |          |
| Vinylchloride            | 48              | 48       |                       |       |       |       |       |       |       |       |       |  |      |          |

Table 26: VOC Annual Statistics at Windsor (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                 | # of<br>Samples | Nb. < DL | P<br>5% | E<br>25% | R<br>50% | T<br>75% | L<br>90% | S     | Max   | Min   | Mean  | Std.Dev. |
|---------------------------|-----------------|----------|---------|----------|----------|----------|----------|-------|-------|-------|-------|----------|
| 1,1,1,2-tetrachloroethane | 36              | 0        | 0.148   | 0.165    | 0.174    | 0.188    | 0.213    | 0.232 | 0.142 | 0.177 | 0.021 |          |
| 1,1,2,2-Tetrachloroethane | 36              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.052 | 0.050 | 0.050 | 0.000 |          |
| 1,1,2-Trichloroethane     | 36              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.052 | 0.050 | 0.050 | 0.000 |          |
| 1,1-Dichloroethane        | 36              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.052 | 0.050 | 0.050 | 0.000 |          |
| 1,1-Dichloroethylene      | 36              | 33       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.092 | 0.050 | 0.053 | 0.010 |          |
| 1,1-Dichloroethylene      | 36              | 13       | 0.050   | 0.050    | 0.087    | 0.145    | 0.226    | 0.507 | 0.050 | 0.115 | 0.098 |          |
| 1,2,3-Trimethylbenzene    | 36              | 33       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.090 | 0.050 | 0.052 | 0.008 |          |
| 1,2,4-1-Trichlorobenzene  | 36              | 33       | 0.076   | 0.184    | 0.401    | 0.651    | 1.095    | 2.307 | 0.050 | 0.501 | 0.487 |          |
| 1,2,4-1-Trimethylbenzene  | 36              | 33       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.058 | 0.050 | 0.050 | 0.001 |          |
| 1,2-Dichlorobenzene       | 36              | 30       | 0.050   | 0.050    | 0.050    | 0.050    | 0.058    | 0.078 | 0.050 | 0.052 | 0.005 |          |
| 1,2-Dichloroethane        | 36              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.075 | 0.050 | 0.051 | 0.004 |          |
| 1,2-Dichloropropane       | 36              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.052 | 0.050 | 0.050 | 0.000 |          |
| 1,2-Diethylbenzene        | 36              | 5        | 0.050   | 0.057    | 0.120    | 0.194    | 0.323    | 0.683 | 0.050 | 0.151 | 0.135 |          |
| 1,3,5-1 trimethylbenzene  | 36              | 7        | 0.050   | 0.055    | 0.087    | 0.127    | 0.218    | 0.459 | 0.050 | 0.109 | 0.085 |          |
| 1,3-Butadiene             | 36              | 33       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.063 | 0.050 | 0.051 | 0.002 |          |
| 1,3-Dichlorobenzene       | 36              | 30       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.142 | 0.050 | 0.055 | 0.017 |          |
| 1,3-Diethylbenzene        | 36              | 20       | 0.050   | 0.050    | 0.050    | 0.080    | 0.164    | 0.424 | 0.050 | 0.085 | 0.082 |          |
| 1,4-Dichlorobenzene       | 36              | 36       |         |          |          |          |          |       |       |       |       |          |
| 1,4-Dichlorobutane        | 36              | 14       | 0.050   | 0.050    | 0.073    | 0.163    | 0.206    | 0.463 | 0.050 | 0.110 | 0.089 |          |
| 1,4-Diethylbenzene        | 36              | 0        | 0.146   | 0.242    | 0.367    | 0.556    | 0.815    | 1.989 | 0.108 | 0.455 | 0.371 |          |
| 1-Butene/Isobutene        | 36              | 36       |         |          |          |          |          |       |       |       |       |          |
| 1-Butyne                  | 36              | 34       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 1.236 | 0.050 | 0.093 | 0.206 |          |
| 1-Decene                  | 36              | 32       | 0.050   | 0.050    | 0.050    | 0.050    | 0.052    | 1.097 | 0.050 | 0.081 | 0.174 |          |
| 1-Heptene                 | 36              | 16       | 0.050   | 0.050    | 0.050    | 0.116    | 0.254    | 1.042 | 0.050 | 0.118 | 0.174 |          |
| 1-Hexene                  | 36              | 32       | 0.050   | 0.050    | 0.050    | 0.050    | 0.064    | 0.095 | 0.050 | 0.053 | 0.011 |          |
| 1-Methylcyclohexene       | 36              | 28       | 0.050   | 0.050    | 0.050    | 0.050    | 0.088    | 0.237 | 0.050 | 0.060 | 0.033 |          |
| 1-Methylcyclopentene      | 36              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 1.649 | 0.050 | 0.094 | 0.267 |          |
| 1-Nonene                  | 36              | 34       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 2.241 | 0.050 | 0.111 | 0.365 |          |
| 1-Octene                  | 36              | 5        | 0.050   | 0.050    | 0.095    | 0.158    | 0.229    | 1.095 | 0.050 | 0.137 | 0.177 |          |
| 1-Pentene                 | 36              | 13       | 0.050   | 0.050    | 0.056    | 0.085    | 0.137    | 0.267 | 0.050 | 0.077 | 0.046 |          |
| 1-Propyne                 | 36              | 21       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 3.036 | 0.050 | 0.359 | 0.678 |          |
| 1-Undecene                | 36              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.481 | 0.050 | 0.062 | 0.072 |          |
| 2,2,3-1Trimethylbutane    | 36              | 0        | 0.080   | 0.177    | 0.237    | 0.340    | 0.703    | 1.404 | 0.079 | 0.317 | 0.262 |          |
| 2,2,4-1Trimethylpentane   | 36              | 31       | 0.050   | 0.050    | 0.050    | 0.050    | 0.065    | 0.154 | 0.050 | 0.055 | 0.019 |          |
| 2,2,5-1Trimethylhexane    | 36              | 2        | 0.050   | 0.064    | 0.116    | 0.177    | 0.280    | 0.693 | 0.050 | 0.146 | 0.122 |          |
| 2,2-Dimethylbutane        | 36              | 35       | 0.050   | 0.050    | 0.050    | 0.050    | 0.050    | 0.138 | 0.050 | 0.052 | 0.015 |          |
| 2,2-Dimethylhexane        | 36              | 31       | 0.050   | 0.050    | 0.050    | 0.050    | 0.056    | 0.154 | 0.050 | 0.054 | 0.018 |          |

**Table 26: VOC Annual Statistics at Windsor (2003)**

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds                    | # of Samples | No. < DL | 5%    | P     | E     | R     | C     | N     | T     | I     | L     | E     | S     | Max   | Min   | Mean  | Std.Dev. |
|------------------------------|--------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
| 2,2-Dimethylpropane          | 36           | 34       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.081 | 0.050 | 0.051 | 0.005    |
| 2,3,4-Trimethylpentane       | 36           | 6        | 0.050 | 0.050 | 0.066 | 0.088 | 0.124 | 0.155 | 0.175 | 0.244 | 0.259 | 0.244 | 0.259 | 0.539 | 0.050 | 0.125 | 0.107    |
| 2,3-Dimethylbutane           | 36           | 0        | 0.068 | 0.113 | 0.209 | 0.304 | 0.474 | 0.304 | 0.176 | 0.372 | 0.474 | 0.276 | 0.474 | 1.164 | 0.065 | 0.243 | 0.214    |
| 2,3-Dimethylpentane          | 36           | 1        | 0.057 | 0.119 | 0.152 | 0.246 | 0.424 | 0.151 | 0.099 | 0.181 | 0.247 | 0.181 | 0.247 | 0.842 | 0.050 | 0.205 | 0.159    |
| 2,4-Dimethylhexane           | 36           | 17       | 0.050 | 0.050 | 0.051 | 0.073 | 0.135 | 0.073 | 0.499 | 0.798 | 0.798 | 0.798 | 0.798 | 0.352 | 0.050 | 0.076 | 0.058    |
| 2,4-Dimethylpentane          | 36           | 6        | 0.050 | 0.056 | 0.088 | 0.126 | 0.213 | 0.126 | 0.135 | 0.196 | 0.240 | 0.135 | 0.196 | 0.529 | 0.050 | 0.112 | 0.094    |
| 2,5-Dimethylbenzaldehyde     | 30           | 30       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |
| 2,5-Dimethylhexane           | 36           | 21       | 0.050 | 0.050 | 0.050 | 0.070 | 0.115 | 0.070 | 0.115 | 0.272 | 0.272 | 0.272 | 0.272 | 0.556 | 0.050 | 0.069 | 0.043    |
| 2-Ethyl-1-butene             | 36           | 36       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |
| 2-Ethyltoluene               | 36           | 10       | 0.050 | 0.050 | 0.050 | 0.107 | 0.155 | 0.107 | 0.155 | 0.244 | 0.244 | 0.244 | 0.244 | 0.606 | 0.050 | 0.129 | 0.112    |
| 2-Methyl-1-butene            | 33           | 5        | 0.050 | 0.050 | 0.069 | 0.105 | 0.175 | 0.105 | 0.175 | 0.276 | 0.276 | 0.276 | 0.276 | 1.106 | 0.050 | 0.144 | 0.123    |
| 2-Methyl-2-butene            | 36           | 6        | 0.050 | 0.056 | 0.096 | 0.176 | 0.372 | 0.176 | 0.372 | 0.474 | 0.474 | 0.474 | 0.474 | 0.842 | 0.050 | 0.166 | 0.201    |
| 2-Methylheptane              | 36           | 3        | 0.050 | 0.071 | 0.099 | 0.151 | 0.247 | 0.151 | 0.247 | 0.326 | 0.326 | 0.326 | 0.326 | 0.989 | 0.050 | 0.181 | 0.326    |
| 2-Methylhexane               | 36           | 0        | 0.113 | 0.208 | 0.271 | 0.499 | 0.798 | 0.271 | 0.499 | 0.798 | 0.798 | 0.798 | 0.798 | 1.762 | 0.096 | 0.395 | 0.332    |
| 2-Methylpentane              | 36           | 0        | 0.275 | 0.450 | 0.957 | 1.315 | 1.315 | 1.315 | 1.315 | 1.946 | 1.946 | 1.946 | 1.946 | 5.160 | 0.240 | 1.077 | 0.962    |
| 2-Pentanone/Isovaleraldehyde | 30           | 4        | 0.050 | 0.072 | 0.097 | 0.135 | 0.206 | 0.135 | 0.206 | 0.250 | 0.250 | 0.250 | 0.250 | 0.237 | 0.050 | 0.110 | 0.053    |
| 3,6-Dimethylcyclohexane      | 36           | 35       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.237 | 0.050 | 0.055 | 0.031    |
| 3-Ethyltoluene               | 36           | 2        | 0.050 | 0.124 | 0.250 | 0.395 | 0.631 | 0.395 | 0.631 | 1.478 | 1.478 | 1.478 | 1.478 | 0.556 | 0.050 | 0.307 | 0.292    |
| 3-Methyl-1-Butene            | 36           | 25       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.147 | 0.050 | 0.059 | 0.021    |
| 3-Methyl-1-pentene           | 36           | 35       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.056 | 0.050 | 0.050 | 0.001    |
| 3-Methylheptane              | 36           | 4        | 0.050 | 0.067 | 0.089 | 0.153 | 0.244 | 0.153 | 0.244 | 0.665 | 0.665 | 0.665 | 0.665 | 0.398 | 0.050 | 0.127 | 0.117    |
| 3-Methylhexane               | 36           | 2        | 0.050 | 0.207 | 0.306 | 0.463 | 0.776 | 0.463 | 0.776 | 1.980 | 1.980 | 1.980 | 1.980 | 0.405 | 0.050 | 0.377 | 0.377    |
| 3-Methylpentane              | 36           | 0        | 0.282 | 0.387 | 0.762 | 1.120 | 1.120 | 1.120 | 1.120 | 1.452 | 1.452 | 1.452 | 1.452 | 3.398 | 0.214 | 0.847 | 0.638    |
| 4-Ethyltoluene               | 36           | 6        | 0.050 | 0.062 | 0.127 | 0.202 | 0.316 | 0.202 | 0.316 | 0.694 | 0.694 | 0.694 | 0.694 | 0.244 | 0.050 | 0.157 | 0.141    |
| 4-Methyl-1-pentene           | 36           | 33       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.177 | 0.050 | 0.054 | 0.021    |
| 4-Methylheptane              | 36           | 21       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.266 | 0.050 | 0.065 | 0.040    |
| Acetaldehyde                 | 30           | 0        | 0.797 | 0.979 | 1.681 | 2.077 | 2.738 | 2.077 | 2.738 | 4.569 | 4.569 | 4.569 | 4.569 | 0.736 | 0.736 | 1.711 | 0.854    |
| Acetone                      | 36           | 0        | 0.998 | 2.076 | 3.534 | 5.647 | 6.338 | 5.647 | 6.338 | 8.945 | 8.945 | 8.945 | 8.945 | 3.785 | 0.956 | 3.785 | 2.155    |
| Acetylene                    | 36           | 0        | 0.474 | 0.793 | 1.184 | 1.843 | 2.572 | 1.843 | 2.572 | 3.326 | 3.326 | 3.326 | 3.326 | 0.412 | 0.412 | 1.356 | 0.721    |
| Acrolein                     | 30           | 8        | 0.050 | 0.050 | 0.112 | 0.183 | 0.284 | 0.183 | 0.284 | 0.315 | 0.315 | 0.315 | 0.315 | 0.050 | 0.050 | 0.134 | 0.084    |
| a-Pinene                     | 33           | 1        | 0.055 | 0.122 | 0.328 | 0.871 | 1.233 | 0.871 | 1.233 | 2.488 | 2.488 | 2.488 | 2.488 | 0.050 | 0.050 | 0.582 | 0.634    |
| Benzaldehyde                 | 30           | 1        | 0.058 | 0.116 | 0.141 | 0.283 | 0.412 | 0.283 | 0.412 | 0.642 | 0.642 | 0.642 | 0.642 | 0.050 | 0.050 | 0.204 | 0.136    |
| Benzene                      | 36           | 0        | 0.590 | 1.079 | 1.520 | 2.347 | 2.833 | 2.347 | 2.833 | 6.287 | 6.287 | 6.287 | 6.287 | 0.576 | 0.576 | 1.746 | 1.093    |
| Benzylchloride               | 36           | 36       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |
| b-Pinene                     | 33           | 22       | 0.050 | 0.050 | 0.050 | 0.062 | 0.126 | 0.062 | 0.126 | 0.202 | 0.202 | 0.202 | 0.202 | 0.050 | 0.050 | 0.067 | 0.037    |
| Bromodichloromethane         | 36           | 31       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.068 | 0.068 | 0.068 | 0.068 | 0.126 | 0.050 | 0.055 | 0.016    |
| Bromoforn                    | 36           | 33       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.061 | 0.061 | 0.061 | 0.061 | 0.050 | 0.050 | 0.051 | 0.003    |



**Table 26: VOC Annual Statistics at Windsor (2003)**

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds                         | # of Samples | No. < DL | 5%    | P     | E     | R     | C      | E      | N      | T      | I     | L     | E     | S     | Max   | Min   | Mean  | Std.Dev. |
|-----------------------------------|--------------|----------|-------|-------|-------|-------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|----------|
| Bromomethane                      | 36           | 0        | 0.057 | 0.072 | 0.072 | 0.072 | 0.090  | 0.103  | 0.108  | 0.267  | 0.053 | 0.097 | 0.047 | 0.047 | 0.047 | 0.047 | 0.047 | 0.047    |
| Butane                            | 36           | 0        | 2.091 | 2.742 | 3.584 | 4.769 | 7.564  | 15.653 | 1.147  | 4.394  | 2.782 | 0.056 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015    |
| Camphene                          | 33           | 26       | 0.050 | 0.050 | 0.050 | 0.050 | 0.081  | 0.115  | 0.050  | 0.056  | 0.056 | 0.056 | 0.053 | 0.053 | 0.053 | 0.053 | 0.053 | 0.053    |
| Carbon tetrachloride              | 36           | 0        | 0.568 | 0.601 | 0.647 | 0.681 | 0.724  | 0.761  | 0.724  | 0.761  | 0.564 | 0.644 | 0.053 | 0.053 | 0.053 | 0.053 | 0.053 | 0.053    |
| Chlorobenzene                     | 36           | 36       | 0.050 | 0.050 | 0.050 | 0.050 | 0.093  | 0.116  | 0.093  | 0.116  | 0.050 | 0.056 | 0.018 | 0.018 | 0.018 | 0.018 | 0.018 | 0.018    |
| Chloroethane                      | 36           | 32       | 0.050 | 0.050 | 0.050 | 0.050 | 0.093  | 0.116  | 0.093  | 0.116  | 0.050 | 0.056 | 0.018 | 0.018 | 0.018 | 0.018 | 0.018 | 0.018    |
| Chloroform                        | 36           | 0        | 0.072 | 0.076 | 0.091 | 0.125 | 0.190  | 0.328  | 0.190  | 0.328  | 0.064 | 0.110 | 0.057 | 0.057 | 0.057 | 0.057 | 0.057 | 0.057    |
| Chloromethane                     | 36           | 0        | 1.058 | 1.136 | 1.453 | 1.627 | 1.751  | 2.108  | 1.751  | 2.108  | 1.050 | 1.388 | 0.281 | 0.281 | 0.281 | 0.281 | 0.281 | 0.281    |
| cis-1,2-Dichloroethylene          | 36           | 35       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.080  | 0.050 | 0.051 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005    |
| cis-1,2-Dimethylcyclohexane       | 36           | 36       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| cis-1,3-Dichloropropene           | 36           | 36       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| cis-1,3-Dimethylcyclohexane       | 36           | 36       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| cis-1,4/1-1,3-Dimethylcyclohexane | 36           | 22       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| cis-2-Butene                      | 36           | 9        | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| cis-2-Heptene                     | 36           | 33       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| cis-2-Hexene                      | 36           | 32       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| cis-2-Pentene                     | 36           | 18       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| cis-3-Heptene                     | 32           | 25       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| cis-3-Methyl-2-pentene            | 36           | 26       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| cis-4-Methyl-2-pentene            | 36           | 32       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| Crotonaldehyde                    | 30           | 24       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| Cyclohexane                       | 36           | 2        | 0.050 | 0.087 | 0.117 | 0.193 | 0.277  | 0.451  | 0.277  | 0.451  | 0.050 | 0.146 | 0.095 | 0.095 | 0.095 | 0.095 | 0.095 | 0.095    |
| Cyclopentane                      | 36           | 35       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| Cyclopentene                      | 36           | 0        | 0.053 | 0.093 | 0.136 | 0.195 | 0.328  | 0.773  | 0.328  | 0.773  | 0.052 | 0.187 | 0.174 | 0.174 | 0.174 | 0.174 | 0.174 | 0.174    |
| Decane                            | 36           | 30       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| Dibromochloromethane              | 36           | 5        | 0.050 | 0.075 | 0.117 | 0.196 | 0.356  | 0.610  | 0.356  | 0.610  | 0.050 | 0.166 | 0.133 | 0.133 | 0.133 | 0.133 | 0.133 | 0.133    |
| Dibromomethane                    | 36           | 33       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| Dichloromethane                   | 36           | 33       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| d-Limonene                        | 33           | 20       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| Dodecane                          | 36           | 3        | 0.050 | 0.083 | 0.140 | 0.226 | 0.312  | 0.593  | 0.312  | 0.593  | 0.050 | 0.173 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130    |
| EDB                               | 36           | 34       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| Ethane                            | 36           | 0        | 3.149 | 4.437 | 5.990 | 9.642 | 14.146 | 26.421 | 14.146 | 26.421 | 1.990 | 7.464 | 4.840 | 4.840 | 4.840 | 4.840 | 4.840 | 4.840    |
| Ethylbenzene                      | 36           | 0        | 0.115 | 0.261 | 0.379 | 0.608 | 1.047  | 2.005  | 1.047  | 2.005  | 0.103 | 0.501 | 0.399 | 0.399 | 0.399 | 0.399 | 0.399 | 0.399    |
| Ethylbromide                      | 36           | 35       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.050  | 0.050  | 0.050  | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | 0.050    |
| Ethylene                          | 36           | 0        | 0.871 | 1.437 | 2.215 | 3.519 | 5.457  | 17.867 | 5.457  | 17.867 | 0.811 | 2.933 | 2.952 | 2.952 | 2.952 | 2.952 | 2.952 | 2.952    |
| Formaldehyde                      | 30           | 0        | 1.450 | 1.775 | 2.849 | 3.941 | 4.957  | 11.347 | 4.957  | 11.347 | 1.446 | 3.141 | 2.006 | 2.006 | 2.006 | 2.006 | 2.006 | 2.006    |

**Table 26: VOC Annual Statistics at Windsor (2003)**

Unit: micrograms per cubic metre (µg/m<sup>3</sup>)

| Compounds           | # of<br>Samples | No. < DL | 5%    | P     | E     | R     | C      | F      | N     | T     | I     | L | E | S | Max | Min | Mean | Std.Dev. |
|---------------------|-----------------|----------|-------|-------|-------|-------|--------|--------|-------|-------|-------|---|---|---|-----|-----|------|----------|
| Freon11             | 36              | 0        | 1.615 | 1.709 | 1.826 | 1.867 | 1.931  | 2.135  | 1.580 | 1.802 | 0.133 |   |   |   |     |     |      |          |
| Freon13             | 36              | 0        | 0.533 | 0.619 | 0.663 | 0.707 | 0.751  | 0.824  | 0.526 | 0.662 | 0.076 |   |   |   |     |     |      |          |
| Freon14             | 36              | 0        | 0.105 | 0.112 | 0.119 | 0.128 | 0.267  | 0.637  | 0.098 | 0.150 | 0.099 |   |   |   |     |     |      |          |
| Freon12             | 36              | 0        | 2.454 | 2.629 | 2.764 | 2.911 | 3.137  | 3.350  | 2.318 | 2.779 | 0.218 |   |   |   |     |     |      |          |
| Freon22             | 36              | 0        | 0.581 | 0.625 | 0.689 | 0.840 | 1.057  | 2.082  | 0.554 | 0.775 | 0.270 |   |   |   |     |     |      |          |
| Heptane             | 36              | 0        | 0.069 | 0.153 | 0.256 | 0.350 | 0.715  | 1.484  | 0.060 | 0.330 | 0.285 |   |   |   |     |     |      |          |
| Hexachlorobutadiene | 36              | 36       |       |       |       |       |        |        |       |       |       |   |   |   |     |     |      |          |
| Hexanal             | 30              | 2        | 0.050 | 0.101 | 0.216 | 0.409 | 1.084  | 3.959  | 0.050 | 0.416 | 0.724 |   |   |   |     |     |      |          |
| Hexane              | 36              | 0        | 0.322 | 0.557 | 1.183 | 1.736 | 2.679  | 3.598  | 0.272 | 1.286 | 0.916 |   |   |   |     |     |      |          |
| Hexylbenzene        | 36              | 35       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.136  | 0.050 | 0.052 | 0.014 |   |   |   |     |     |      |          |
| Indane              | 36              | 15       | 0.050 | 0.050 | 0.055 | 0.104 | 0.183  | 0.504  | 0.050 | 0.095 | 0.087 |   |   |   |     |     |      |          |
| Isobutane           | 36              | 0        | 0.717 | 0.931 | 1.297 | 1.944 | 2.564  | 4.874  | 0.574 | 1.572 | 0.915 |   |   |   |     |     |      |          |
| iso-Butylbenzene    | 36              | 36       |       |       |       |       |        |        |       |       |       |   |   |   |     |     |      |          |
| Isopentane          | 36              | 0        | 1.193 | 1.586 | 2.390 | 4.307 | 7.027  | 12.605 | 1.039 | 3.323 | 2.511 |   |   |   |     |     |      |          |
| Isoprene            | 36              | 19       | 0.050 | 0.050 | 0.050 | 0.119 | 0.343  | 1.381  | 0.050 | 0.160 | 0.279 |   |   |   |     |     |      |          |
| iso-Propylbenzene   | 36              | 27       | 0.050 | 0.050 | 0.050 | 0.056 | 0.067  | 0.127  | 0.056 | 0.056 | 0.015 |   |   |   |     |     |      |          |
| m and p-Xylene      | 36              | 1        | 0.218 | 0.633 | 1.052 | 1.652 | 3.339  | 5.766  | 0.050 | 1.380 | 1.236 |   |   |   |     |     |      |          |
| MEK                 | 30              | 0        | 0.397 | 0.607 | 1.237 | 2.072 | 4.014  | 6.110  | 0.322 | 1.653 | 1.430 |   |   |   |     |     |      |          |
| Methylcyclohexane   | 36              | 3        | 0.050 | 0.097 | 0.142 | 0.188 | 0.256  | 0.629  | 0.050 | 0.156 | 0.111 |   |   |   |     |     |      |          |
| Methylcyclopentane  | 36              | 0        | 0.132 | 0.207 | 0.393 | 0.601 | 0.797  | 1.824  | 0.126 | 0.458 | 0.361 |   |   |   |     |     |      |          |
| MIBK                | 30              | 7        | 0.050 | 0.053 | 0.095 | 0.127 | 0.169  | 0.226  | 0.050 | 0.098 | 0.046 |   |   |   |     |     |      |          |
| MTBE                | 33              | 32       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 1.625  | 0.050 | 0.098 | 0.274 |   |   |   |     |     |      |          |
| n-1-tolualdehyde    | 30              | 30       |       |       |       |       |        |        |       |       |       |   |   |   |     |     |      |          |
| Naphthalene         | 36              | 0        | 0.105 | 0.186 | 0.484 | 1.048 | 1.919  | 5.390  | 0.083 | 0.809 | 1.071 |   |   |   |     |     |      |          |
| n-Butylbenzene      | 36              | 28       | 0.050 | 0.050 | 0.050 | 0.050 | 0.070  | 0.136  | 0.050 | 0.056 | 0.018 |   |   |   |     |     |      |          |
| Nonane              | 36              | 4        | 0.050 | 0.071 | 0.111 | 0.163 | 0.268  | 0.587  | 0.050 | 0.141 | 0.113 |   |   |   |     |     |      |          |
| n-Propylbenzene     | 36              | 8        | 0.050 | 0.051 | 0.101 | 0.137 | 0.204  | 0.487  | 0.050 | 0.116 | 0.093 |   |   |   |     |     |      |          |
| Octane              | 36              | 3        | 0.050 | 0.082 | 0.132 | 0.179 | 0.347  | 0.696  | 0.050 | 0.166 | 0.141 |   |   |   |     |     |      |          |
| o-Tolualdehyde      | 30              | 30       |       |       |       |       |        |        |       |       |       |   |   |   |     |     |      |          |
| o-Xylene            | 36              | 0        | 0.098 | 0.220 | 0.357 | 0.508 | 0.994  | 1.972  | 0.083 | 0.453 | 0.398 |   |   |   |     |     |      |          |
| p-Cymene            | 36              | 28       | 0.050 | 0.050 | 0.050 | 0.050 | 0.092  | 0.202  | 0.050 | 0.060 | 0.028 |   |   |   |     |     |      |          |
| Pentane             | 36              | 0        | 0.599 | 1.032 | 1.357 | 2.333 | 3.779  | 7.156  | 0.567 | 1.842 | 1.370 |   |   |   |     |     |      |          |
| Propane             | 36              | 0        | 1.426 | 3.523 | 4.820 | 7.144 | 11.361 | 31.234 | 1.400 | 6.490 | 5.593 |   |   |   |     |     |      |          |
| Propionaldehyde     | 30              | 0        | 0.175 | 0.228 | 0.330 | 0.493 | 0.647  | 0.928  | 0.155 | 0.387 | 0.187 |   |   |   |     |     |      |          |
| Propylene           | 36              | 0        | 0.242 | 0.460 | 0.610 | 0.850 | 1.330  | 5.029  | 0.177 | 0.809 | 0.831 |   |   |   |     |     |      |          |
| p-Tolualdehyde      | 30              | 30       |       |       |       |       |        |        |       |       |       |   |   |   |     |     |      |          |
| sec-Butylbenzene    | 36              | 35       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050  | 0.053  | 0.050 | 0.050 | 0.001 |   |   |   |     |     |      |          |

Table 26: VOC Annual Statistics at Windsor (2003)

Unit: micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ )

| Compounds                     | # of<br>Samples | No. < DL | P     | E     | R     | C     | E     | N | T | I | L | E | S | Max    | Min   | Mean  | Std.Dev. |
|-------------------------------|-----------------|----------|-------|-------|-------|-------|-------|---|---|---|---|---|---|--------|-------|-------|----------|
|                               |                 |          | 5%    | 25%   | 50%   | 75%   | 90%   |   |   |   |   |   |   |        |       |       |          |
| Styrene                       | 36              | 11       | 0.050 | 0.050 | 0.082 | 0.134 | 0.174 |   |   |   |   |   |   | 0.254  | 0.050 | 0.096 | 0.052    |
| tert-Butylbenzene             | 36              | 36       |       |       |       |       |       |   |   |   |   |   |   |        |       |       |          |
| Tetrachloroethylene           | 36              | 0        | 0.068 | 0.111 | 0.144 | 0.241 | 0.320 |   |   |   |   |   |   | 0.606  | 0.064 | 0.185 | 0.123    |
| Toluene                       | 36              | 0        | 0.671 | 1.552 | 2.222 | 4.608 | 6.281 |   |   |   |   |   |   | 17.416 | 0.617 | 3.343 | 3.181    |
| trans-1,2-Dichloroethylene    | 36              | 34       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   |   | 0.055  | 0.050 | 0.050 | 0.001    |
| trans-1,2-Dimethylcyclohexane | 36              | 36       |       |       |       |       |       |   |   |   |   |   |   |        |       |       |          |
| trans-1,3-Dichloropropene     | 36              | 36       |       |       |       |       |       |   |   |   |   |   |   |        |       |       |          |
| trans-1,4-Dimethylcyclohexane | 36              | 32       | 0.050 | 0.050 | 0.050 | 0.050 | 0.054 |   |   |   |   |   |   | 0.077  | 0.050 | 0.051 | 0.005    |
| trans-2-Butene                | 36              | 6        | 0.050 | 0.055 | 0.082 | 0.148 | 0.249 |   |   |   |   |   |   | 0.519  | 0.050 | 0.121 | 0.097    |
| trans-2-Heptene               | 36              | 34       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   |   | 0.058  | 0.050 | 0.050 | 0.001    |
| trans-2-Hexene                | 36              | 29       | 0.050 | 0.050 | 0.050 | 0.050 | 0.079 |   |   |   |   |   |   | 0.216  | 0.050 | 0.059 | 0.031    |
| trans-2,4-Diene               | 36              | 29       | 0.050 | 0.050 | 0.050 | 0.050 | 0.087 |   |   |   |   |   |   | 0.132  | 0.050 | 0.057 | 0.019    |
| trans-2-Pentene               | 36              | 7        | 0.050 | 0.058 | 0.094 | 0.160 | 0.281 |   |   |   |   |   |   | 0.762  | 0.050 | 0.142 | 0.149    |
| trans-3-Heptene               | 36              | 35       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   |   | 0.064  | 0.050 | 0.050 | 0.002    |
| trans-3-Methyl-2-pentene      | 36              | 34       | 0.050 | 0.050 | 0.050 | 0.050 | 0.050 |   |   |   |   |   |   | 0.111  | 0.050 | 0.052 | 0.010    |
| trans-4-Methyl-2-pentene      | 36              | 36       |       |       |       |       |       |   |   |   |   |   |   |        |       |       |          |
| Trichloroethylene             | 36              | 9        | 0.050 | 0.052 | 0.071 | 0.115 | 0.131 |   |   |   |   |   |   | 0.213  | 0.050 | 0.085 | 0.041    |
| Undecane                      | 36              | 1        | 0.050 | 0.105 | 0.167 | 0.285 | 0.407 |   |   |   |   |   |   | 0.675  | 0.050 | 0.212 | 0.162    |
| Valeraldehyde                 | 30              | 8        | 0.050 | 0.050 | 0.101 | 0.211 | 0.566 |   |   |   |   |   |   | 1.250  | 0.050 | 0.186 | 0.245    |
| Vinylchloride                 | 36              | 36       |       |       |       |       |       |   |   |   |   |   |   |        |       |       |          |

# Map 1: Locations of Continuous Air Monitoring Stations in Ontario (2003)







